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A

PRACTICAL ACCOUNT

OF

THE EPIDEMIC CHOLERA,

AND OF

THE TREATMENT

REQUISITE IN

THE VARIOUS MODIFICATIONS OF THAT DISEASE.

By WILLIAM TWINING,

OF THE ROYAL COLLEGE OF SURGEONS, LONDON; FIRST ASSISTANT SURGEON,
GENERAL HOSPITAL, CALCUTTA.

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TO

SIR JAMES Mc GRIGOR, Bart., F.R.S

Director General, Medical Department.

My dear Sir;

As you have always been the kind adviser of my professional pursuits, I take the liberty to present to you the following Observations on the Nature of the Epidemic Cholera, and the influence of the various modes of treatment which have been employed in that disease.

The interest you take in all professional investigations, and more particularly in those relating to the Epidemic Cholera, since that disease has appeared in Great Britain, is a further inducement for me to bring this work to your notice, knowing that if it prove of public utility, I may confide in the justice which it will receive at your hands.

I have the honour to be,

My dear Sir,

Your very faithful and obedient servant,

W. TWINING.

Calcutta, March 1832.

TO

SIR WM. RUSSELL, BART.

M. D.,

Formerly Surgeon to the General Hospital, Calcutta, and now Member of the Board of Health, London.

MY DEAR SIR;

THIS work is offered to your notice, in testimony of my remembrance of the kindness with which you encouraged every pathological inquiry, during many years that I was on duty, under your orders, at the General Hospital in Calcutta, and of the readiness with which your ample experience of the diseases of India was always available for the benefit of the sick in that Institution. I doubt not that some of the following pages will bring to your recollection the arduous duties of former days. I could have referred to you, regarding some of the cases, but your absence has prevented me from affixing to you any responsibility connected with this publication; to which, nevertheless, I will hope for your approbation, as you are able to judge of the fidelity and diligence with which many of the observations were made.

I have the honour to be,

Dear Sir,

Your very faithful and obedient servant,

W. TWINING.

Calcutta, March 1832.

PREFACE.

THE matter contained in the following pages was collected and arranged for the purpose of forming part of a work on the diseases of Bengal, the publication of which I still entertain the hope of being able to accomplish. The accounts we have recently received of the prevalence of Cholera in its most fatal forms in some parts of Great Britain, have induced me to send this treatise home for immediate publication, with the hope that, if the disease should prevail extensively in that country, these remarks may prove useful to those practitioners who have not had much opportunity of treating that destructive complaint.

The sources of my experience affording grounds for the following observations have been various. The more deliberate and laborious investigations have been made in the General Hospital, and among the cases which have occurred in the city of Calcutta and its vicinity; where the disease almost always exists in some of its forms. The early part of my service in the Upper Provinces of India, enabled me to observe the disease during the cold season in the vicinity of the great snowy mountains which divide this country from Tartary, and in situations where we might suppose, from a considerable similarity of climate during winter, that modifications of cholera would be found similar to those which occur in the northern parts of Europe. In those districts I found sporadic cases of Cholera, exhibiting the same symptoms, following the same course, and terminating in the same manner that the disease does in the low flat country and humid atmosphere of Bengal Proper. It appeared to me, that during the cold weather in the Upper Provinces, the proportion of instances in which the functions of the lungs seemed impeded by a morbid secretion of mucus in the bronchial tubes, was greater than I have observed in other parts of the country, and a wheezing noise in respiration was there an occasional symptom. In some cases it was attended with considerable expectoration of mucus.

I have endeavoured to add to our knowledge of Cholera, by diligent observation of all the phenomena connected with its origin, progress, and termination, and of the effects produced by remedies in various forms and stages of the disease. My attention has been particularly directed to the condition of the blood, and to the deviations which take place, from the healthy state of many of those functions that can be observed during life, as well as to the morbid changes noticed in dead bodies on *post-mortem* examinations. Out of a multitude of observations recorded on these subjects, I now offer to the public such as appear to me illustrative of the nature of the disease, and likely to be of practical utility.

I have not mentioned any peculiar odour, as characteristic of Cholera, because I am not able to distinguish any particular smell, either of the perspiration or of the evacuations, that I could deem characteristic of the disease, and not found in some others. However, my occupations in the pursuit of morbid anatomy may make my testimony on this head less conclusive; and I should be unwilling to enter into any discussion on this subject, with those who may be of a different opinion.

Perhaps my readers may consider that undue attention has been bestowed on an inquiry into the nature of the peculiar alvine evacuations, usually described as resembling rice-water, and denominated the *true Cholera stools;* but as the results of all my examinations and analyses authorize me to differ from many authors of respectability, who speak of such stools as serous fluids, or more distinctly assert that they are the serum of the blood, I have thought it necessary to go somewhat more into detail on that subject than was requisite on other points, where my observations confirm the opinions of my professional brethren, or, at all events, do not directly contradict them.

For the purpose of preventing mistakes in the administration of remedies, by the young apprentices at the Hospital, it is the custom in this country to write the instructions for taking the different medicines, in English, under the Latin prescriptions. They have been copied in the same way into my note-book, and I have not thought it necessary to make any alteration, my only object being to convey an accurate account of the disease, of the treatment employed, and of the results which followed.

CONTENTS.

	Page
Symptoms of Cholera	1
Disordered Functions of the Lungs during Cholera	23
State of the Blood in Cholera	26
Nature of the Watery Stools and Matter vomited	29
State of the Urine in Cholera	33
Pathological Remarks	34
Progress of the Disease towards Recovery or to Fatal Termination	38
Morbid Appearances observed on Dissection	45
Causes of Cholera	55
Treatment	61
Cases of Cholera connected with febrile or inflammatory Condition	78
Blood-letting injurious in some Descriptions, and in certain Stages of the Disease	141
Arteriotomy in Cholera	156
Cases attended with early Collapse—treated first by Opium and Stimulants	168

Page
Galvanism in Cholera 207
Mercurial Salivation does not prevent an Attack of the Disease 211
Cholera in Children 224
——— in Asiatics 230
Cases, shewing the Stage of the Disease at which the Secretions were taken for Examination and Analysis 235
Facts relative to Contagion 258

CHOLERA.

Vomiting and purging are the symptoms of Cholera, which most commonly first attract the attention, and excite the alarm of patients. The importance and danger of these symptoms must be estimated according to the nature and duration of various concurrent phenomena. With the first efforts of vomiting and purging, the ordinary contents of the stomach and intestines, in most instances, seem to be entirely expelled; after which, as the disease goes on, an aqueous fluid like rice-water is voided by stool: that which is vomited is nearly of the same sort, but has generally its appearance modified by the remedies administered.

The whey-like appearance of the stools is so commonly attendant in the worst cases, that it is often spoken of as the *true cholera stool,* or the *congee stool.* The evacuations are sometimes nearly as clear as pure water, and frequently some films of mucus are floating in this sort of fluid. The incipient degree of favourable change in the disease, is marked by a transition from the states of the evacuations above mentioned, to a drab-colour, then to a grey, and subsequently to a darker colour as the improvement goes on.

Besides the above symptoms, we find in Cholera, sudden and extreme prostration of strength; the countenance is either pale or livid; the eyes are much sunk in their sockets, as if from the sudden absorption of the surrounding fat, and shrinking of the cellular structure of the orbit. There is generally a degree of livid venous congestion of the scleroticæ and conjunctivæ, though sometimes a florid arterial suffusion of the eyes is observed. The sunk eyes, shrunk features, and ghastly expression of countenance, are so remarkable and peculiar, as to be immediately recognised by those who have once seen a cholera patient. The medical man whose illness is mentioned in a subsequent part of this chapter, had no suspicion of his disease being Cholera, till about noon of the day on which he died, when he desired his servant to bring him a small looking-glass, and the instant it was brought, he said, "I see I have got Cholera,* which I did not even suspect before: there can be but little hope of my recovery." He had suffered no spasms, and from there having been a slight bilious tinge in the stools, he had not been aware of the nature of his complaint at its early stage, and thus lost his life.

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* This gentleman had only seen a few well-marked cases of Cholera in the Hospital, about a month before.

In bad cases, the voice becomes feeble, shrill, and pectoral; respiration short, difficult, and imperfect; the tongue is cold and moist; coldness of the whole body, but more especially of the extremities, and a shrivelled state of the fingers, takes place. This mortal coldness is sometimes coeval with the earliest symptoms of Cholera, but I have never known it attended with shivering or rigours, like the cold stage of ague, in which the patient earnestly demands more bed-clothes: on the contrary, the cholera patient when coldest throws off the blankets, tosses about in anxiety, and calls for cold drink. The cessation of the calorific function is as remarkable during the hot weather as at the coldest season of the year; in fact, the hot bath, hot vapour, or other means of producing artificial warmth, often have not the slightest effect; although inanimate bodies exposed to the same means of raising the temperature, are quickly heated. When the spirit vapour has been employed, the wood and cane of the bedstead may be felt quite hot, while the patient lies as cold as before the vapour was used. When the tendency to collapse commences, the surface of the body (particularly about the chest and upper extremities) is wet with a profuse cold sweat, the pulse becomes weak, rapid, and indistinct; there is often great oppression at the scorb. cordis, and occasionally a sense of burning heat at that part, with anxiety and restlessness.

The belly is sometimes tense, tumid, and painful on pressure; but this is rare, the usual condition of the abdomen being flat, doughy, and inelastic. In a few rare instances of irritable and nervous subjects, there is vast extrication of intestinal flatus, with a sort of roaring hickup. In advanced stages of bad cases of the disease, ordinary hickup is sometimes a transient symptom. Intense and distressing thirst soon takes place, in almost all the severer attacks of Cholera; and a sensation of noise in the ears, or some degree of deafness, occurs in a considerable number.

Spasms of the extremities, though present in the majority of cases to a certain degree, during some period of the disease, are sometimes entirely absent in patients where death takes place very suddenly; and even in some protracted cases, where nearly all the other more aggravated symptoms above enumerated precede the fatal event. The spasms generally begin in the toes and fingers, then, after affecting the calves of the legs very violently, they often proceed to the thighs and belly.

Some patients have very little of either vomiting or purging; the earliest apparent symptoms seeming to announce the general failure of vital energy, and the incipient death of the patient. Such is the variety in the disease, that I could not mention any symptom of Cholera which is not occasionally absent, in cases which terminate in death with the most awful rapidity. I have met with a few cases, in which the patients came to hospital with the same coldness of the extremities, shrivelled fingers, and obstructed circulation, as above described; at the same time that they were passing a thin bloody fluid, not unlike thin chocolate. These patients had usually been ill three or four days, and died within twelve hours of admission into hospital. On dissection, the most intense degree of lurid, duskey-red colour of the mucous membrance of the great intestines was observed, especially at the cœcum; inflammation of the small intestines, and morbid vascularity of omentum and mesentery. This condition was only observed in neglected cases of several days duration, of which no distinct history could be obtained.

With almost every year I have observed the above symptoms to vary in severity, as well as in the order of succession; and to be combined in different ways. In some seasons, the ordinary characters of the disease are in the majority of cases attended by a febrile affection more or less distinct; spasms are then generally violent and painful, causing the patient to cry aloud: the efforts to vomit are violent, but the quantity of fluid voided both upwards and downwards is frequently not very great. The pulse, though rapid, not sinking very soon, and the warmth of extremities not suddenly ceasing. In such cases the vascular congestion of the eyes is commonly of a florid arterial character; the tongue furred, often brownish, and usually warm; sometimes it is dry and very slightly furred. During other seasons, the greater number of severe cases become cold at an early period, the evacuations mostly very copious and watery, the pulse sinks rapidly, and becomes indistinct; the voice is feeble, shrill, and pectoral, or entirely inaudible; congestion of the eyes of lurid venous character, and a lurid colour of the face and neck take place, as if from stagnation of venous blood: spasms, when present, are then attended with less pain; and torpor, insensibility, and death, soon close the scene. The affection of the head, in remote stages of the disease, sometimes resembles coma; and in a few rare cases transient delirium exists, but generally we find the intellectual faculties remarkably clear and undisturbed during the whole course of Cholera. In other years many cases are of a mixed character, beginning with febrile tendency; and a few of them are found vomiting much green bilious watery fluid at first; but rapidly sinking into the state of collapse, with cessation of pulse, cold tongue, and shrivelled extremities. This appears to me a common form of the disease in the last two years, since Cholera has become much less frequent.

The commencement of the disease with febrile symptoms; and their continuance, while the constitution shews signs of sensibility, action, and power; the warmth and circulation remaining, and the evacuations though frequent never having been very profuse, indicate a tractable state of disease, in which the best results may be hoped from a cautious, steady, and discriminating treatment. While the early accession of torpor, which defies the effect of medicine, with cold and shrivelled extremities, cessation of pulse, cold tongue, and copious evacuations, indicate a modification of disease in which we have but little to hope in the majority of cases, after these symptoms have existed for four hours.

We must always bear in mind, that those who are affected with the febrile form of the disease, do frequently in a short period sink into a state of coldness and torpor: and on the other hand, also, that in the last stage of collapse there are sometimes symptoms of a short and ineffectual re-action of the system, with morbid heat about the head and chest, for a few hours before death; but there is rarely a return of steady and regular pulse. Vomiting, purging, and spasms, frequently all cease for some hours before death.

Whenever an epidemic visitation of Cholera occurs, affecting suddenly a number of persons in one place, a large proportion of the earlier cases are usually of a very severe description, with tendency to early accession of coldness, torpor, and collapse: a considerable number of these appear inevitably fatal. During the first three or four days of an epidemic visitation, the rapidity of the progress of Cholera towards fatal termination seems to increase. I am not aware that the severer form of the disease has ever continued permanent in a station so long as six days; and by the eighth or tenth day we commonly find only slight cases occurring. Inattention to this fact is liable to lead to erroneous estimation of the efficacy of any plan, or of the various modes of treatment employed. On one occasion, when Cholera occurred in a severe form in detachments recently arrived from Europe, nineteen men died of the twenty-one first attacked with the disease; and of the next thirty-one cases which occurred on the following days, in the same detachment, six only died: a still milder form of Cholera succeeded, and the whole of the patients then recovered. This occurred in May 1827; and the plan of treatment, which was inert in the early cases of the disease, was attended by the most happy results at a more remote period of this endemic Cholera, in the same detachment.

The invasion of Cholera most frequently appears in a violent form, between the hours of two and five A.M. Regarding the mode in which this disease begins, I may observe that a careful reference to my experience authorises me to say, that its attack often commences suddenly, and without any premonitory symptoms: sometimes it abruptly supervenes on the advanced stage of severe acute Dysentery. The Cholera is occasionally preceded by a slight pyrexia; and it has also appeared to me, that congestive fevers do sometimes, though rarely, fall into a state of collapse resembling the low stage of this disease; not indeed very often attended with violent vomiting and cramps, but the patient suddenly becomes weak and cold; sometimes voiding one *true Cholera stool:* at other times, even this symptom is absent. After the sudden death of fever-patients in this manner, I have several times found, on dissection, the thickened state of the coats of the small intestines, and that portion of the canal loaded with pale, watery fluid, like rice-water; with much of the subalbid mucus, and thick white paste, which are usually considered characteristic of Cholera. In short, the sudden collapse which occasionally supervenes at the termination of a paroxysm of remittent fever, somewhat resembles the collapse in Cholera.

Prior to the more distinct and alarming attack, there are sometimes for a few hours, and in some cases for two or three days, symptoms of indisposition, evident not only to the patient himself, but to his friends. When Cholera is raging severely, the disease is often ushered in by diarrhœa; at other times it begins with catarrh, nausea, and oppression at the scrobiculus cordis; which are not in an early stage to be distinguished from the slight indisposition which often precedes Fever. The approach of Cholera in this manner makes the patient suppose he is "feverish or bilious;" and if recourse be had to some of the medicines commonly used in slight ailments of that sort, the disease is said to be caused by the dose of medicine taken; when, in fact, it had been insidiously making considerable progress for some hours. When Cholera is prevailing in the vicinity, slight catarrhal, or febrile affections, and disorder of the stomach and bowels, whether tending to diarrhœa or to constipation, seem convertible into Cholera by the use of saline or drastic cathartics.

more especially if they operate about two or three o'clock in the morning.

Case I.—A gentleman of dark complexion, and generally very healthy, of regular and moderate habits, twenty-eight years of age, and five years in Bengal, awoke on the morning of the 18th March 1830, with slight feeling of uneasiness, which he ascribed to indigestion, and therefore on returning from his usual morning ride took a small dose of Epsom salts; soon after which nausea took place, and a cup of tea was vomited two hours after taking the salts: the extremities soon became cold and shrivelled, voice weak and pectoral, tongue cold, countenance livid, eyes sunk, and cornea dull. The pulse gradually grew feeble and indistinct; there were occasional slight efforts to vomit, at intervals of half an hour; and only four stools from the commencement to the termination of the attack: the two first of these stools very copious, and like grey water; the other two scanty, and of pale-drab colour. There was dreadful anxiety, some thirst, and occasionally slight cramp, by which the fingers and toes were drawn up, but not very great pain. He died at four P.M., nine hours after taking the salts. The few cases of Cholera occurring about this time, had for the most part a tendency to sudden collapse.

Case II.—A stout and healthy woman, twenty-two years of age, eight years in India, was recovering in a satisfactory manner after her accouchement, nursing her infant, and beginning to go about the house: on the 14th September, 1825, which was the twenty-second day after the birth of the child, she felt slightly feverish, and took six grains of calomel at bed-time, not being considered seriously sick, either by herself or the family. She rose at two A.M. on the 15th, to let her boy suck, but made then no complaint: soon after three o'clock a profuse purging of dark fluid took place; some of the evacuations passed in bed, and those that were last voided were a pale-grey water; there was neither vomiting nor spasms; the hands and feet became cold, and she died at a quarter past five, in less than two hours and a-half after the first purging. This woman was living in tolerable comfort, in an upper-roomed house, had not been down stairs since her confinement, and the friends asserted that she had not been imprudent in diet, or in any other respect. Cholera of a severe description was at this time frequent among the natives, in the immediate vicinity of this person's house.

Case III.—Michael Hammon, H. M. 13th Light Infantry, a stout young man, eighteen years of age, recently arrived from Europe, felt some slight ailment on the 20th May, and came to hospital on the night of the 21st, with pain at upper part of belly, constipation, and slight fever: he had an enema, and castor oil in the night, and senna and salts on the 22d, by which he was freely purged, and appeared to be getting better; on the 23d, twenty grains of jalap and as much cream of tartar were given, which acted very freely during the day; and about two A.M. on the 24th a watery purging took place, with coldness of extremities, feeble pulse, dreadful thirst, and cramps: his life was saved with difficulty, and he was discharged on the 13th June.

There were several very bad cases of Cholera in the Hospital at this time; and within a few days, other men of the same detachment were admitted into Hospital with Spasmodic Cholera, and some of them died.

I have known more than one case, where persons feeling some slight indisposition, have taken a dose of rhubarb and magnesia, with a small quantity of ginger, early in the morning; after which, distinct Cholera symptoms appeared with the first purgative effects of the medicine, by ten o'clock ; and the disease proved fatal within twelve hours. It is evident, in most such cases, that an insidious attack of Cholera was going on before the medicine was taken. However, I am of opinion, that when Cholera is prevailing, drastic purgatives, particularly senna and salts, or jalap, have frequently brought on the disease in persons who had at the time only slight pyrexia; and who, if left without active purgatives, would not then have had Cholera. The experience of many years has so far confirmed this opinion, that we usually are cautious in ordering either jalap or salts in the Hospital, when we have many patients with Cholera under treatment here, or when that disease is prevailing in the town; and at such times it is deemed hazardous to give a patient any medicine likely to act on the bowels, between two and five A.M.: therefore we have usually, if possible, avoided giving, even to febrile cases, on those occasions, calomel and colocynth at bed time. I do not remember ever having heard the commencement of an attack of Cholera imputed to a dose of castor oil.

CASE IV.—Michl. Regan, a recruit, recently landed from Europe, who had been eleven days in Hospital with catarrh, was quite well, and ordered to be discharged in the afternoon of 10th Dec. 1825, to join his Regiment. He ate his dinner as usual, and in a few minutes he vomited: the worst symptoms of Cholera soon came on, and he died of that disease. There was no want of prompt and assiduous attention in this case, for I was in Hospital at the time that he began to vomit, and saw him in less than fifteen minutes afterwards.

Case V.—A stout and healthy lady, of light complexion, aged twenty-six, who had been fifteen months in India, was attacked with vomiting and purging, at three o'clock P.M., on the 2d September, 1825: spasms of the extremities soon came on, and by five o'clock collapse had taken place to such a degree that her life was despaired of: she died before dark the same evening. This person had been quite well up to the moment of the attack: ate her tiffin as usual, and was afterwards occupied in arranging books in the library; standing on a chair to place those on the upper shelves. When so occupied, she felt sick, in consequence, as she supposed, of reaching too high: in a few minutes after the first sensation of sickness, she began to vomit, and all the worst symptoms of the disease quickly followed.

I have met with many instances, when in the Upper Provinces, where Sipahees, who marched from the Camp early in the morning quite well, have suddenly fallen to the ground, with violent spasms of the extremities; and in whom vomiting, purging, coldness, and all the worst symptoms of Cholera came on quickly.

Some other phenomena, not yet described, are so intimately connected with the character of Cholera, and indicative of the morbid changes which take place in that disease, that they deserve particular attention. When the patient, from the first attack, sinks rapidly into a low state, with feeble pulse, cold extremities, shrivelled fingers (as if from long maceration in water), and weak pectoral voice, the carbonic acid gas evolved by respiration is much less than that contained in the air from the lungs of persons in health. I have several times found the quantity of carbonic acid gas, as low as

1·5 per cent.* of the air expired from the lungs of patients in the state described above; and seldom so much as two per cent.: whereas air from the lungs of patients suffering from febrile Cholera, with violent and painful spasms, free pulse, and warmth of surface; contained 3·5 to four per cent. of carbonic acid gas, and sometimes more. I have been particularly careful in the mode of procuring the air from the lungs for these experiments, and have made numerous trials on the expired air of healthy persons, in order to enable me to speak confidently on this subject. I make the patient take rather a forced inspiration; and then holding the nose till some of the air is expired by the mouth, have the apparatus ready to collect the next portion for experiment; hoping by this means to procure a portion of air that has been fairly subjected to whatever vital and chemical action may be going on in the lungs. By always using these precautions, and operating on one given quantity of air, I hoped to insure a relative uniformity of results, and the greatest possible precision. It is often very difficult to procure even ten cubic inches of air in a satisfactory manner, from the lungs of a person in a state of lowness and collapse, when restlessness and extreme anxiety prevail. It appears to me, that the great discrepancy stated in the results of eudiometric experiments on the respired air of healthy persons; when those who conducted the analyses were men of equal eminence, and undoubted accuracy; must have arisen from their having not observed similar precautions in collecting the air for their operations: for there has been a tolerable uniformity in the result of the experiments made by each person; though in some cases a difference of nearly one-half, from the conclusions of others.

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* In these cases, I have reason to believe that the pulmonary vapour, or exhalation, is much diminished.

When we can succeed in bleeding a man, who is in the state of lowness and collapse, while torpor is impending; we find the blood is generally thick, black, and tarry, trickling down the arm in a slow and unsteady stream; and the flow very often entirely ceases as soon as the veins of the fore-arm are emptied. This blood usually coagulates into an uniform mass, without separating any serum; and the surface of the cruor, after standing till it is cold, becomes somewhat more florid than when first drawn. In other cases, the dark-coloured blood separates a small quantity of reddish serum, which exhibits no peculiar character except its colour: and when heat is applied to this discoloured serum, it forms a firm, dry, friable coagulum, which in a few instances is of a pale, dusky green colour. When Cholera is attended with febrile symptoms, the blood generally separates into serum and crassamentum, nearly as in healthy subjects; though the quantity of serum varies considerably, and sometimes the surface of the cruor is remarkably florid; not unfrequently it exhibits the buffy coat, indicative of local inflammation; several examples of which will be detailed. I acknowledge having two or three times seen the cruor quite florid, and still the patient has rapidly sunk into a cold and torpid state after the V. S. and, although the blood flowed freely, the patients were lowered, and made worse by it: but this florid appearance has been so rare, as not to have allowed sufficient opportunities of ascertaining satisfactorily the circumstances connected with it, in such cases as have terminated fatally.

The subalbid fluid, usually denominated the true Cholera stool, or the conjee stool, has been repeatedly and carefully analysed; as well as the fluid ejected by vomiting. Of the latter it is impossible to speak with any confidence, except in cases where the patients have been a considerable time in Hospital, and carefully watched, so as to ascertain what fluids may have been drank, and what remedies taken: consequently, it has not been possible to make so many satisfactory examinations of the fluid that is vomited. In a case of febrile Cholera, attended with profuse evacuations, I have by the smell recognised peppermint water, which had passed through the intestines in about two hours and a-half: and have been able to detect in the stools, fluids acidulated with cream of tartar, which had been drank less than three hours before. Therefore, if the analysis of Cholera stools be deemed important, the circumstances of the disease and nature of the ingesta should be attended to. The following results have been obtained, on examination of the fluid vomited; and of the watery and subalbid stools usually admitted to be characteristic of Cholera.

The Cholera stools frequently consist of two portions; a thin watery fluid, and a pale-grey thicker substance like dirty mucilage, or the sediment in barley water, part of which will pass through a muslin strainer with the more watery portion; and if left in a large test-tube for four hours, the thicker part subsides, and is found to possess the following properties:

α It is in slight degree soluble in cold water.

β The greater part is soluble in a mixture of equal parts of distilled water, and Liquor Ammoniæ.

γ Exposed in a small evaporating dish to the heat of the spirit-lamp, it dries into a thin pellicle, which does not contract much when heated: but in the progress of desiccation, it exhales a nauseous odour of putrid flesh.

The subalbid fluid, which floats on the

pot, when the true Cholera stools are left to settle in the test-tubes, affords the following indications:

α With litmus, very seldom any effect is produced; and when any is observed, it is a slight reddening of the litmus paper, denoting the presence of an acid.

β Exposed to heat, it does not coagulate; even if the temperature be raised to the boiling point.

γ Treated with pure alcohol, it is not coagulated; but in a few rare cases, a very trivial cloudy opacity appears on the addition of the Alcohol.

δ Treated with a solution of oxymuriate of mercury in distilled water; sometimes a slight opaque cloud is formed, which in twelve hours subsides to the bottom of the test-tube: forming a minute sediment like mucilage, not amounting to $\frac{1}{32}$ of the quantity of fluid tested.

ε Solution of subacetate of lead, when dropped into the fluid, even in the most minute quantity, instantly causes a curdled appearance, and a precipitate subsides in the course of an hour. This is in such remarkable quantity, that the sediment amounts to from one-third to one-eighth of the quantity of fluid tested.

ζ The infusion of galls sometimes causes a slight turbidness: and in some of the experiments a few very light films were formed, which slowly subsided towards the bottom of the tube in the course of twelve hours. If left to stand for two or three days, the fluid at the top of the test-tube becomes of a rusty brown colour, which after a longer period is changed to black.

The Cholera stools which appear like *clear water*, afford the same indications as above stated, when tried with the several tests: but on the addition of solution of subacetate of lead, the curdled appearance instantly produced, is of a more snowy whiteness; and when this subsides, it is much smaller in quantity than the precipitate of a subalbid cholera stool, tried with the same test.

The fluid vomited in cases of Cholera, when obtained under circumstances which gave reason to believe that the secretion of the stomach was obtained free from the fluids recently drank, only differs from the above in being more viscid and slimy: the results of analysis have been the same as those afforded by the more fluid portion of the conjee stools; but the indications of the presence of an acid have been stronger.

The results of a multitude of experiments accord generally with these statements. Without entering into minutiæ, concerning the conclusions deducible from the above; it is evident from Ex. β. that the subalbid evacuation, called the true Cholera stool, does not consist of the serum of the blood, as some authors have stated. I have found the conjee stools not coagulable by heat, when the blood of the same patient has separated a small quantity of serum, which has coagulated firmly on the application of heat. The occasional indications of an acid in the Cholera evacuations; while we know that uncombined soda is generally found in serous fluids;

would be an additional reason for our not acknowledging the conjee stools to be the serum of the blood.

By the employment of Dr. Bostock's test, the subacetate of lead, in Ex. ε. the peculiar secretion of Cholera is proved to consist chiefly of mucus. We may therefore conclude that the Cholera stools consist of mucus, and a peculiar morbid secretion; without any appreciable quantity of the serum of the blood.

In a subsequent part of this chapter I will mention a few cases, shewing the state of the patient and the stage of the disease, when the evacuations were taken for analysis.

When the kidneys continue to secrete during Cholera, the urine appears to be nearly the same as that of a healthy person; in containing urea, and the ordinary salts of the urine: whether exactly in the usual proportions, I have not been able to determine. In some cases, the small quantity of limpid urine first voided after a suppression of that secretion for several hours; appeared to contain a large quantity of animal matter, and the putrefactive changes were observed to take place in it very early.

In the assemblage of symptoms which constitute the early stage of a sudden invasion of Cholera; we observe evidence of the disorder, or total cessation of the functions of those organs, which are supplied with nerves from the great solar plexus. In those cases tending to early collapse and coldness, the liver and kidneys cease to secrete as usual; the digestive powers are arrested, the mucous membrane of the stomach and intestines has its secretions altered; and the disorder of the respiratory function, reminds us of the alliance in the healthy, as well as diseased actions of the lungs,* with the digestive organs ; through the influence of the nervous system generally, and more especially of the pneumo-

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* Whoever undertakes an accurate pathological inquiry, relative to the nature of Cholera, and has extensive opportunity to pursue his investigations ; will find many reasons for concluding, that among the most important lesions of function which take place in that disease ; the decarbonising power of the lungs is affected to a very great degree ; more especially in those cases which are attended with early collapse and coldness, and are void of any febrile and inflammatory symptoms. In connection with this subject, we have occasion in post-mortem examinations sometimes to observe the contents of the cœcum and colon black, when the contents of the small intestines are of a lighter colour. These facts will induce us to inquire whether the black colour of the contents of the colon, and of the stools which appear during life in certain stages of Cholera, be in all cases dependent on black cystic bile. Is there not reason to conclude, that the black secretions in the cœcum and colon, may depend on an effort of nature to compensate by a carbonaceous secretion, for the inefficient action of the lungs and skin ? Many patients die of Cholera before such secretion is established.

Viewing the depressed state of the decarbonising power of the lungs, as an important pathological condition; we would be especially cautious in administering to a Cholera patient in a state of collapse, such remedies as are known to have a direct effect in diminishing the quantity of carbon evolved by the lungs during respiration: among the most powerful of which agents we find mercury; ardent spirits, in such quantity as to produce a stupifying, in contradistinction to their exhilarating and exciting effect, and the abstraction of blood.

Facts coincide with the above observations; and I know of no case of *pure congestive* or *blue Cholera*, without febrile or inflammatory symptoms; in which mercury does much good: in such cases, stupifying quantities of spirituous stimulants, like stupifying doses of opium, decidedly hurry on the fatal event; and indiscreet use of the lancet has certainly in some cases shortened life. Although this view of the subject is here alluded to, in hopes that its legitimate application to practice may hereafter undergo the strictest examination and experimental investigation: I may state that I have, in very bad cases of the low form of Cholera, been so

far

gastric nerves. The most undeviating phenomena of Cholera attended with early collapse, are the recession of blood from the surface of the body, and its accumulation in the great veins of the abdomen and thorax; a gorged state of the capillary vessels of the lungs; and disordered secretion from the mucous membrane of the intestinal canal: at the same time that the mucous membrane of the bronchial tubes and cells of the

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far influenced by these considerations, as to abstain from the free use of calomel, to stimulate with ammonia, and to use only small quantities of spirits or brandy, trusting to the warm resinous purgatives, given alternately with castor oil, and enemas: enjoining tranquillity, and supporting the system by mild farinaceous food in small quantity. The result has been satisfactory; the pulmonary system has resumed its healthy action, and ultimate recovery followed in the most favourable manner; without the appearance of black stools. Cautious trials of this sort, on a large scale, are requisite, before we can be authorized in recommending the general employment of such a practice.

lungs, occasionally has its secretion affected in a similar manner, though to a slighter degree.

In cases not fatal, the progress of recovery is often almost as rapid as the accession of Cholera; and if the disease be promptly treated at the very onset, it is not uncommon to see a person well on the third day after the attack of the worst symptoms, which had commenced with coldness and collapse; and who, if left without remedies, would probably have died in six or eight hours. In these instances, recovery seems almost as sudden and complete, as in cases of suspension of animation from submersion in water.

We see a person suddenly attacked with vomiting, and purging of cholera-stools, he quickly becomes cold and has a rapid feeble pulse: we know that if left to the course of nature, or supplied with a few glasses of cold water, this patient will be in a hopeless state in a few hours; whereas, if he get a table spoonful of tincture of rhubarb undiluted, or a teaspoonful of laudanum, and as much spirit of sal volatile, in an ounce of water; immediately on the first attack, the disease is very often at once arrested.

Many of the febrile cases, especially those where there is a dry tongue and feverish flush of the face, are slower in arriving at complete convalescence; and we have occasionally sufficient evidence, that, besides the disordered functions, and congestion with incipient inflammation, of the early stage; there is a decided tendency to a slow inflammatory condition of several internal organs, at remote periods. When reaction commences, it is irregular, and I have seen one eye suffused with bright arterial redness, while the other eye was pale.

Patients who remain without pulse at the wrist above three hours, seldom survive the attack; though we sometimes succeed by means of ammonia, camphor, assafœtida, and small quantities of opium, combined with warm resinous purgatives; and some stimuli of spices, wine, or spirits; to resuscitate the pulse, and restore the warmth of skin, in persons who have been a whole day cold and without pulse at the wrist. Yet the majority of those so excited, ultimately expire, after lying a longer or shorter period, sometimes several days, in a half-torpid state, without either spasms or purging: while in this state they suffer much nausea, and continue to vomit whatever fluid is drank; gulping up every eight or ten minutes, almost without effort, large mouthfuls of yellowish green bile, which is spat over the bed-clothes and floor, without moving the head. While this condition lasts, an attempt to sit up in bed causes faintness.

This is almost as hopeless a condition as a Cholera patient can fall into: in cases of this sort, free blood-letting, or an active purgative is apt to sink the patient irrecoverably: stimulants excite fever, and hurry on the fatal termination. By whatever mode these cases are treated, the most intense gastro-enteritis is found after death, and the intestines are loaded with superabundance of bile and dark-coloured secretions. A few recover by the cautious application of leeches, as soon as the patient will bear them without sinking the pulse; repeated use of moderate V. S. is often requisite in the latter stage of these cases; and perseverance in a steady course of resinous purgatives; with the mildest food in small quantities, supplied in succession to the first effects of each purgative. An emetic, and particularly a sulphate of zinc emetic, is sometimes found in such cases, to produce the most beneficial change. In other cases resuscitated by stimulants, after long continued collapse, as above stated; a febrile condition follows, with frequent weak pulse, and lurid redness of face, resembling the remote stage of bad cases of remittent Fever.

The fatal termination of Cholera, in some of the most sudden cases commencing with extreme collapse; seems to depend on the intensity of the efficient cause of the disease, acting so powerfully on the nervous system as to produce total arrest of all vital energy; and death, as it were by suspension of animation; cessation of vital actions taking place, with hardly any preliminary course of disease.

Many others die from venous congestion, with a remarkable stagnation of the blood in the great veins of the internal parts of the body, and cessation of most of the secretions; combined with a less degree of that sort of shock of the nervous system, which produces the sudden termination just described.

The fatal event at a still later period, has more or less of local inflammation, superadded to congestion; and combined with the remains of such disorder of the nervous system as in its more intense degree causes early death.

While a rapid and weak pulse continues, though there be not much purging and vomiting, the patient must be deemed in the utmost danger.

The severer cases of Cholera, with early coldness and collapse, tending to sudden death without reaction, have been already alluded to; and the absence of inflammation of the stomach and intestines, in many of those cases, has been pointed out. The peculiar nature of that description of Cholera, is still more remarkable, when we observe the same stage of that disease attacking dysenteric patients who had been for many days voiding bloody stools; but who, on being seized with Cholera, cease to void blood, and their evacuations change to the fluid resembling rice-water; examples of which were seen in the cases of Cox, and Post, which are mentioned in this chapter: affording evidence of the fact, that the circulation in the capillary system of vessels of internal organs in the febrile Cholera, is in a state totally different from what takes place when the Cholera with sudden coldness and early collapse comes on; and when in fact the essential character of the disease consists in accumulation and stagnation of blood in the veins, and principally in the great internal veins. Robust and plethoric subjects suffering from this form of disease, also exhibit strong marks of stagnation of blood in the smaller cutaneous veins; affording the appearance which has been denominated the blue Cholera: a state of disease often existing in the most intense degree, when totally void of inflammation.

Morbid Appearances on Dissection.

The appearances observed on the inspection of subjects that have died of Cholera, are various; according to the nature and duration of the illness, and the circumstances that have preceded and accompanied the attack. In the damp hot climate of Bengal, we are obliged to perform our dissections at an early period after dissolution, generally from three to twelve hours. And it has frequently occurred to me to observe, that bodies are warm for some hours after death, although the persons, while suffering under Cholera, had been exceedingly cold for several hours, and sometimes more than a whole day, before they died. The exterior of bodies after death from Cholera, is generally found livid from the stagnation of venous blood in the capillaries, especially about the chest and neck: and still more so at those parts which are dependent, and liable to be discoloured by the gravitation of blood. The muscles are generally rigid, of a lurid red colour: and robust subjects are seldom emaciated by those attacks of Cholera which are fatal after a short period of illness. But even in these, the eyes are sunk deeply into the sockets, and the fingers, hands, and feet, remain shrivelled. In a few weak and emaciated subjects, the surface is whiter, and corrugation of skin more extensively visible.

The most common morbid appearances in the viscera of those who die after an illness of only a few hours; are a pale colour of the stomach, when viewed externally; a thickening of its coats, so as to feel like a thick new doe-skin glove;

its interior is also sometimes quite pale, but generally of a pink colour, in patches of various sizes and covered with a thick tenacious viscid mucous secretion. The mucous membrane of the stomach is often much corrugated into longitudinal folds; and when its secretions are seen not tinged by medicines, they are usually at this stage of the disease, a pale-grey water: frequently the stomach is relaxed, and this secretion is then in very large quantity. The small intestines of a pale pink colour, that in many cases could hardly be deemed morbid, their coats thickened and pulpy, as if œdematous, the villous coat sometimes quite pale: their contents usually consisting of a whey-like fluid, and a thick curdled mucus, in various proportions. More rarely we find the small intestines loaded with quantities of a substance resembling a thick paste of flour and water, and occasionally there is a fluid like dirty gruel, or like the sediment in barley-water. The great intestines at this stage of the disease, are of a pale bluish colour, with little or no vascularity, their coats frequently remarkably thin; contents, copious and watery, or like rice-water in which some films of mucus are floating. The great portal and mesenteric veins and the cavæ, turgid with blood. Liver and spleen usually tumid from venous congestion, especially if the subject be plethoric. The gall-bladder is found to contain bile of various shades of green, usually somewhat inspissated, but frequently appearing in a healthy state. In a few emaciated subjects, where the watery purging had been very profuse during life, and the extremities remained much corrugated after death; the peritoneal coat of the abdominal viscera was sometimes dry, and not covered with the usual lubricating serosity; the whole of the viscera seeming shrunk and bloodless. The cavities of the heart are usually distended with black blood. The lungs generally exhibit a degree of venous congestion, which, at the depending parts, is much increased by gravitation. The bronchial tubes in some cases filled with frothy fluid; in others, lined with a tenacious mucus of a very viscid description, which when scraped off and collected, resembled a thick paste of wheaten flour. This latter appearance usually found in cases where the voice had been feeble and *pectoral*, and it is certainly more commonly met with in the cold season: suppression of voice occasionally occurs when this morbid bronchial secretion does not exist. Venous congestions in the brain and spinal marrow, inconsiderable in emaciated subjects; but remarkable in those who were plethoric. Bladder contracted, generally contained about two ounces of limpid urine; and a small quantity of white mucus can be seen on its internal surface.

The above morbid appearances of the

viscera, in cases of Cholera proving rapidly fatal; are supposed to be the vestiges of a much higher scale of vascular turgescence during life : but this is doubtful.

When the patient has lived longer, and Cholera has been attended with violent and painful spasms; but more especially when a prolonged disease has been marked by any febrile symptoms, the congestions above described, are attended by distinct appearances of inflammation of the small intestines. The omentum, mesentery, and mesocolon, present a high degree of morbid vascularity: the mucous membrane of the stomach is more extensively and more highly coloured with red, and this is often the case when on examining the exterior of the stomach, it is still pale and its coats much thickened. In more advanced stages, the coats of the small intestines are found thin and diaphanous, so that masses of viscid mucus, deeply tinged with green bile, may be seen before opening the gut; and in these cases there is usually much flatus in the small intestines, with some pale-grey fluid. Proceeding to speak of those who have survived to the third or fourth, or fifth day; inflammations of the intestines are more distinct and extensive: the small intestines are then found to contain quantities of viscid mucus of various colours, and green bile; the large intestines filled with dark-grey, dark-brown, or black thin fluid. The morbid appearances in the ulterior stages of febrile Cholera, very much resemble those seen in the dissection of subjects who have died during the remote stages of remittent Fever.

Some of those in whom the disease begins with early sinking and deadly coldness, survive that stage for two or three days; having a slight degree of lurid redness of face, with ineffectual reaction of the system, marked by returning warmth of skin and improved state of the pulse; but they are inclined to faint when in the erect posture: such cases are often found to sink into a state of stupor, and die on the fourth or fifth day. Dissection then shews much venous congestion of the brain, still more of the lungs; and a general lurid redness of the small intestines, which approaches to a mahogany colour; but sometimes no congeries of minute vessels is to be seen: we are inclined to speak of this state; as mortification of the muscular fibres of the intestine, for the intestines are very easily torn. In such cases, their contents are mostly a thin chocolate-coloured fluid. The cœcum usually strongly marked by the lurid appearance of its coats, which are thin.

When febrile and spasmodic symptoms have predominated, we occasionally find intus-susceptions in the small intestine, and still more frequently portions of the canal contracted to the size of the little finger: the contracted portion of intestine sometimes red, but more commonly paler than the rest. I have very often seen a contraction at the sigmoid flexure of the colon, of a foot in length, without any morbid vascularity at that part; the mucous membrane at the constricted part exceedingly corrugated and almost dry. Lumbrici are occasionally found in the intestines.

In the dissections of Cholera subjects, I have sometimes met with morbid appearances, which would not seem essentially the result of the disease; and they probably have been influenced by circumstances in which the patient was placed prior to, or during the commencement of the attack. In the post-mortem examinations of sailors who were seized by Cholera in the Bazaars, where they had been much exposed to the sun, and in habits of dissipation; a considerable serous effusion has been found between the arachnoid and pia mater, over the whole convex surface of the brain; and frequently there is serous effusion in the spinal canal. The same appearances have been observed in sober people, in whom Cholera came on after much exposure to the sun, and proved fatal. These patients have generally soon sunk into a torpid condition, without much suffering from spasms: they quickly became cold, and died within fifteen or sixteen hours after the attack commenced. The sailors of the H. C. ship *Bridgewater*, were exposed to severe privations and much hard work, during a succession of gales of wind on the homeward voyage from China; and the ship was so much injured that she was brought to Calcutta. Soon after the crew landed, in June 1830, many of the men were attacked with Cholera, which quickly proved fatal to several of them. On dissection, serous effusion was found on the hemispheres of the brain; and in some of the cases, a large quantity of serum in the lateral ventricles. On several occasions, when ships in coming up the river in the rainy season, have got aground, or lost their anchors, whereby the crew have been obliged to work hard, and were much exposed to the weather, and probably at the same time living irregularly: the sailors have been attacked with Cholera; the peculiarities of which consisted in the patients having in several cases tympanitic distension of the belly, cold hands, and hot feet. On dissection, acute inflammation of the colon was found, besides the other morbid appearances common in Cholera.

CAUSES OF CHOLERA.

The cause of the more frequent appearance of Cholera for some years past, is unknown; and we are unacquainted with any circumstances which are sure to produce the disease, or by avoidance of which, residents in India can be certain of always escaping its attack. Cholera occurs at all seasons of the year, and under all circumstances: people who live in the best houses, avoiding excesses of every sort, and who are exempt from any species of privation; are occasionally liable to be seized with the worst forms of this malady. However, we have abundant proof that the disease prevails most, among those who reside in low and ill-ventilated situations, exposed to humid atmosphere and sudden changes of weather; who are frequently using ill-cooked or bad food; and who indulge in eating cold or unripe fruits: more especially if they be at the time exposed to fatigue and unusual privations. People with impaired constitutions, or who are in a state of debility from any cause, are more liable to Cholera than the robust and healthy: and it is certain that persons recently arrived from Europe, are very liable to an attack, if the disease happen to prevail at the time in the vicinity of their residence. The depressing passions, doubtless have much effect in rendering people more liable to an attack of the disease.

Sudden decrease of temperature appears to be among the most frequent exciting causes of Cholera; for we find it has commenced generally between two and five o'clock A.M. when the cold damp air is most sensibly felt in this country. Men are often attacked soon after exposure to rain, when they are fatigued; and many awake ill with cramps and other symptoms of the disease, after having slept in damp clothes. Soldiers on fording a river early in the morning, though the water be not a foot deep, are apt soon to fall ill, especially if they have marched several miles previously, so as to be heated and fatigued before they pass the ford: and they are often attacked in the night, or early in the morning, after encamping on the low damp bank of a rivulet. Hard work, and exposure to the sun and rain alternately, seem occasionally to bring on the disease: and a large dose of saline purgative has frequently excited an immediate attack. When three or four severe cases of Cholera have happened about the same time, at different parts of the town; we know that any man who takes an active saline purge, is very likely to fall quickly into a state of Cholera with collapse. Severe cases of Dysentery, or even slight Diarrhœas, are apt in the most sudden manner to lapse into the low form of Cholera; at those times when the latter disease is prevailing in the vicinity. Drunkenness has been followed by a severe form of the disease among large numbers, as happened in H. M. 14th Regiment, in 1828, at Berhampore; where, after a distribution of 15,000 Rupees prize-money to the soldiers of the Regiment; ninety-four cases of Cholera appeared within a few days, of whom twenty died. Of these ninety-four patients, forty-five had been from nine to fourteen years in India. Nevertheless, at corresponding periods, in other years, we often see patients vomiting violently for hours, and others are purged profusely for several days, without Cholera coming on: intemperance to the utmost extent, exposure to atmospheric vicissitudes, and all the other exciting causes* above enumerated, often exist to an extreme degree, and the disease does not follow. Therefore we must acknowledge that some other cause or circumstance, is essential to the production of Epidemic Cholera; since we see that these circumstances which seem to be efficient in exciting an attack in one year, are not productive of the disease in the next. The disease has been ascribed to some unwholesome condition of the atmosphere, which we have no means of appreciating, except by its effects; as we judge of the presence of malaria, in the case of intermittent Fevers. We know that at times every slight ailment seems convertible into Cholera of the most rapid and fatal description; among the inhabitants of a station where the disease had not previously existed, and where it cannot be traced to the arrival of sick persons, or to any mode of imported infection: the disease appearing about the same time at various and remote parts of the town, among persons of the most opposite habits of living, who have no direct or indirect communication with each other; as was the case in Calcutta in 1830, and on several other occasions. Strangers coming to a town when a general proclivity to Cholera exists, must be very liable to the disease; if they happen to arrive after suffering fatigue and privations, and just when the local distempered state of the atmosphere, with the usual exciting causes, are about to affect the residents of the place. Persons arriving at such a time, with any disorder of the digestive organs, may become the first sufferers; and thus the probability of imported contagion is suggested: though a strict investigation of the circumstances in detail, may be sufficient to negative any idea of contagion.

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* The same observation may be made with respect to many other diseases which are influenced by atmospheric vicissitudes. We cannot give any reason why exposure to sudden changes of temperature, in England, causes Rheumatism to prevail in one year; Ophthalmia in another; Catarrhs in a third; and Fevers in a fourth.

TREATMENT.

In the treatment of Cholera, it is of the utmost importance that remedies be employed early; and that they be varied with careful reference to the nature of the attack, and the existing stage of the disease: for the utmost vigilance and discrimination of the practitioner are often defeated. The cases which will presently be adduced, as well as the various accounts previously published in Bengal, shew us a great class of diseases to which the name *Cholera* has been applied. The whole of these have more or less of a common character so distinctly marked, that we rarely hear of a difference of opinion among practitioners concerning the identity of the disease: and still in some of the individuals of this class we find the prevailing tendency of the complaint, not only different, but diametrically opposite to what constitutes its predominant character in other cases. If the diseases which are acknowledged to be Cholera, were so ranged on a scale as to place those cases which have most affinity together; and those most dissimilar, at a distance: we should find one end of this scale occupied by diseases in which the actions of the constitution are distinctly febrile, and in many of them the evidence of local inflammation is strong and unequivocal, as in the most intense examples of gastro-enteritis. At the other extreme of this scale, we should find the prevailing characters of the disease, as already stated, consisting in coldness, depression of vital actions, and extreme venous congestion; with tendency to sudden death, not preceded by much active disease. Between these two extremes, every possible variety exists: the disease with early collapse and coldness, generally combines an intense degree of congestion of blood in internal organs, with some remote tendency to inflammation of the intestines, and sometimes (though rarely in Bengal,) of the brain: while the febrile cases, and those which are marked by distinct evidence of local inflammation; are by no means void of congestion, and they frequently lapse suddenly into the low state, with coldness, and the most awful prostration of vital power. Our watchful attention to the course of the disease is urgently demanded, on account of this occasional tendency to sudden change; lest we be misled, and induced to use depletion, by V. S. or other means, at a time when such treatment may be injurious. It will be evident that the treatment of Cholera must be varied according to the nature of the disease.

In the febrile and inflammatory stages of the disease, attended with violent and painful spasms, warmth of surface, and free circulation; our chief dependance must be on V. S. leeches, and purgatives of calomel or blue pill, with cathartic extract; alternated with castor oil: in a few of these febrile cases, we may venture on jalap and scammony at more remote periods of the disease. The earlier a case of Cholera of this description is bled, the more certain and effectual is the relief which is obtained. While those patients, who come under treatment at a late period of the disease; even though distinctly marked inflammatory symptoms be present; require great caution in the employment of depletion, and still they are almost certain to die without antiphlogistic treatment. Opium is admissible for one or two doses, in small quantity, at the onset of these febrile cases; when watery evacuations prevail: but except for the purpose of allaying the dreadful commotion of the system, and to arrest profuse purging; we derive little benefit from this remedy. Nothing relieves the spasms of the early stage of febrile Cholera, so effectually as the lancet.

There is a more remote stage of the disease, in which local inflammations take place; appearing sometimes to be excited by premature return to a diet of animal food, and in other cases to arise without any evident cause: we are obliged then to use the lancet, and to purge the patient freely, as in an ordinary inflammatory fever. At the same time, a word of caution is requisite; lest the inexperienced practitioner, should mistake for fever or inflammation, the transient and ineffectual re-action which often occurs just before death: attended with morbid heat of forehead and chest, while the patient is torpid, blue, and restless; as vain attempts have been made to cure these cases by bleeding. The least that can be said of such treatment, is to acknowledge its total inutility.

Where the evacuations have been profuse, it is always advisable to give a small quantity of thin sago, or arrowroot; as soon as the stomach will retain it; and the employment of a small quantity of food of this sort, need not interfere with the general antiphlogistic plan above stated.

The majority of these febrile cases, can generally be saved; if seen early and treated with careful discrimination and perseverance.

In the low description of Cholera, where the vital actions fall early into a state of torpor and collapse, with profuse cold perspirations; we have a much more formidable complaint to contend with. There is but little time for consideration in this form of the disease; it is rapid in its course, and deadly in its tendency: the most judicious measures that can be adopted, too often fail. It is necessary in the first instance to uphold the feeble remains of vital energy, and as it were to resuscitate the patient, otherwise the susceptibility to remedies is speedily extinguished. For this purpose, it is necessary to give some opium with stimulants. If the patient be seen early, and the vital actions have not been very much sunk; half a grain of opium with six grains of blue pill should be given every half hour, while frequent purging continues: and two ounces of hot sago with one ounce of brandy may be taken after the second dose of the pills. In the early stage of those cases where Cholera symptoms have supervened suddenly on diarrhœa; we often see patients whose tongues are cold, the eyes sunk, and prostration extreme, entirely altered in two or three hours; warmth being restored: and we have to manage diarrhœa with slight febrile symptoms. But after a few hours' continuance of the disease; when the pulse becomes low and weak, and the voice feeble, it is necessary to use more active remedies; at the same time, we must always bear in mind the possibility of overpowering the system, either by opiates or spirituous stimuli, when the vital actions are sinking into a low and feeble state. I have seen in these cases, prompt and effectual relief more frequently afforded by opium than by any other remedy. But when this medicine is likely to do good, all the benefit derivable from it, follows quickly after taking one or two doses; and it is more appropriate in those cases attended with profuse watery purging, than in others. Two grains of opium in a pill, sometimes arrest the most formidable symptoms. In other cases where the pill is immediately rejected; the same quantity of opium dissolved in cinnamon water, and mixed with ʒ i. of Spirit of Sal Volatile proves effectual. It is advisable to make the patient drink a cup of hot sago, with some brandy or wine, as soon as the more distressing symptoms are moderated. If this be retained, and tranquillity with sleep follow, we may entertain hopes of recovery.

Under less favorable circumstances, where our early remedies do not produce such immediate benefit; the vomiting and purging are either arrested, or having been from the first less urgent; we find the lowness and coldness not removed. The thirst is extreme, pulse feeble and 120, or more frequent; while a weak pectoral whining voice, indicates the impaired function of the respiratory organs, and inward distress of the patient. In such cases, repetition of opium is apt to stupify the patient, without effecting any other purpose;* and spirits too often seem to overpower him, and render recovery more hopeless. Liquor Ammoniæ Puræ is the best stimulant in such cases: I have given ʒ i. every hour in ℥ iiss, of water, for eight doses; and afterwards every two hours, until the circulation has been restored, and warmth of surface has returned. An infusion of Cayenne Pepper may be made in the proportion of ʒ ii. to a pint of boiling water, and a table-spoonful given every half hour, alternately with the Liquor Ammoniæ. If the patient be calling aloud for drink; instead of giving brandy and water in such cases, I prefer letting him have an infusion of pepper, or ginger, either of which is to be made in the proportion of ʒ i. to the pint of boiling water; and a wine-glassful may be allowed every half hour, either tepid or cold, as the patient likes.

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* I consider Ammonia the best internal stimulant, in cases of approaching torpor, where repeated doses are requisite; it is more effectual, and safer, than either opium or brandy. I have also tried Enemas of four, and six pints of hot water, containing Ammonia in solution; with the view of stimulating the system, and at the same time of washing away from the great intestines, the tenacious paste-like secretion, which they contain. These Enemas were employed only in the most hopeless cases, when other stimuli had failed; therefore they were generally unsuccessful.

While these internal stimuli are used; much benefit may be derived from external applications. European flour of mustard is to be mixed with hot water, and when made to the consistence of an ointment, about one-eighth part of common salt added: this is spread on calico; and applied to the epigastrium and across the lower part of the chest, and to the spine, and feet. If the skin retain any degree of susceptibility, this will soon act as a strong rubefacient, and when left on for five or six hours it blisters. I prefer this to any other external stimulant: after having tried Turpentine, common Blisters, and boiling-water, as well as pure nitric acid; and in extreme cases, the red hot iron has been applied to the epigastrium and spine. The mustard plaster is not so irksome to bear as a blister, and it is free from the appearance of cruelty and harshness, which is an objection to some of the other stimulants just named.

If we are so fortunate as to arrest the progress of symptoms threatening sudden death, the patient generally sleeps for some hours. The subsidence of urgent symptoms, should make us satisfied to wait for three or four hours; and then we must give mild aperient medicine every four hours, until the bowels are made to act moderately. For this purpose, castor oil should be given every eight hours; and in the intervals 12 grains of compound extract of colocynth, with six grains of blue pill, and two grains of aloes. If a tendency to the low stage of the disease still predominate; I would give only half the above quantity of blue pill, and would add two drops of cinnamon oil, or of the oil of peppermint to each dose of the pills. Supporting the patient with sago, arrowroot, or other farinaceous food; and giving wine in small quantity, or omitting it according to the indications of pyrexia, or local inflammation.

After patient begins to recover from

the stage of collapse; the disease seems to balance between a return of the lowness; and the accession of Fever with inflammation: the former condition is the most to be dreaded; it may be brought on by cold drastic purges, untimely bleeding, copious draughts of cold water, or imprudent exertion in attempting to rise to stool. After all that can be effected, by diligence and science; it must be acknowledged that a large proportion of Cholera cases which sink into the state of collapse, are then inevitably fatal.

The domestic management, and accessories to the medical treatment of Cholera patients, are very important. The sick person should be placed in an airy room, on a low and rather narrow bed; that he may be easily and effectually assisted: the room should not be crowded with attendants, nor should the patient be left in a draught of air, but the face may be fanned. If profuse perspirations exist; the surface should be frequently rubbed dry, with hot flannel; but the whole body need not be uncovered at one time, for this purpose. During the low form of the disease with decrease of natural warmth; the patient should be placed between blankets, and the extremities diligently rubbed and champoed by attendants, whose hands are frequently warmed. Tin cases made to hold hot water, or bottles of hot water, or bags of hot sand, are frequently placed by the patient's limbs: but restlessness of the sick, renders these means of affording artificial warmth, generally of little avail. It is proper to prevent patients from rising to stool, so long as there is any appearance of collapse, with lowness and frequency of pulse: and under any circumstances, while copious watery evacuations continue frequent, it is desirable to make the sick remain recumbent, and use a bed-pan. I have many times seen men rise to stool;

and after a copious gush of watery evacuations from the bowels; to fall on the floor, sometimes apparently fainting, at other times convulsed: some of these have died within five minutes after rising to stool, who had not been 12 hours ill, and who had some degree of warmth of surface at the time of getting out of bed; having just before that been speaking rationally, though in a state of anxiety and restlessness. When the pulse at the wrist has ceased, or is very feeble and rapid, the patient anxiously tossing about in his bed, and when entire arrest of the circulation seems impending; any exertion of the patient is likely to prove injurious: either rising to the erect posture, or sitting up in bed, should then be prohibited. The most precise instructions to the attendants, are requisite, regarding the quantity of drink, or aliment to be given: for although a wine-glassful of some drink may be allowed, (to any patient in whom it does not quickly excite vomiting,) and in febrile cases, may be repeated every hour; a free use of fluids, is almost always injurious.

The following cases, are intended to shew the nature of Cholera in Bengal; and the effects of the treatment.

Those in which a febrile or inflammatory condition existed, are arranged first in order; though that form of the disease is not always the most frequent in this part of India. After these are placed, some cases in which it would appear that V. S. was injurious, and others in which it was useless. Then follow some examples of the disease, in which the extraordinary venous congestion, and impeded circulation, were attended with such apparent agony, and laborious heaving of the chest, that I was induced to hope relief might be obtained by opening the radial artery; which was tried, and as much blood obtained as the most urgent advocates of blood-letting in Cholera have considered sufficient to alleviate the oppression. Next in order, are arranged cases in which the sudden coldness and collapse, with sinking of vital power, were so extreme; either that blood could not be obtained from the veins, or the attempt at V. S. was not deemed advisable; and therefore the patients were at first treated by opium and stimulants. These examples, will prove that no exclusive rule of practice can be followed; and that the utmost diligence and discrimination are requisite; to apply such remedies as are best suited to the nature of the attack, and the existing stage of the disease.

Case VI.—Thomas Greenwood, Æt. 21, of middle size and light complexion, recently landed from Europe: was taken ill with purging, at noon on the 16th November, 1830; and he was at stool as often as six times an hour. Cramps in the extremities and vomiting commenced at ten o'clock on the 17th, and as he appeared to be getting worse, he was sent into General Hospital at 11 A.M. His pulse was then 116 and weak; tongue cool and moist; skin cool; and voice feeble: there was slight arterial or florid congestion of the eye-balls; eyes only half open, but a bright light was not painful.

V. S. ad lb. i.
℞. Calomel. ℈ i.—Opii gr. i. in a Pill.
℞. Spirit. Ammoniæ Aromat. ʒ i.
Aquæ Tepid. ℥ iss. misce. To be drank after the Pill.
Extremities rubbed with Spirit of Turpentine.

1 P. M.—Blood not buffy, the cramps have ceased, otherwise he is not much changed; he has been vomiting, and purged often: the evacuations are a clear watery fluid, with flakes of mucus.

℞. Calomel. ℈ i.
Extract. Colocynth. Comp. ℈ ss.—to be taken now, in three Pills; and repeated in two hours. Draught as above, to be repeated with each dose of the Pills.

5 P. M.—Vomiting and purging continue; he complains of thirst; pulse rather more distinct; the last stool is slightly colored with grey fæces.

Repeat the Pills and Draught.

7 P. M.—Had one more stool, of the same appearance as the last; pulse unchanged; his voice is a little stronger; he lies quiet and is cold, the fingers shrivelled; but tongue warm.

℞. Calomel. ℈ ss.—Extract. Colocynth. Comp. Asafœtidæ āā gr. v.—misce, fiant Pill iii. To be taken at 7, and repeated at 9, 11 P. M. and 1, and 3 A. M. to-morrow.
℞. Mist. Camphoræ lb. i.
Sp. Lavand. Comp.—Tinct. Hyoscyami āā ʒ iss. misce.—To take two ounces every two hours.
A cup of hot sago with 1½ ounces Port Wine to be given immediately.

Nov. 18*th* —He has had one scanty, slimy, pale-grey stool, and vomited often during the night. Pulse 102 and feeble; tongue clean, warm, and moist; voice very feeble; has occasional slight cramps in the legs.

℞. Calomel. ℈ ss.—Extract. Colocynth. Comp. gr. v.—misce, fiant Pill ii. To be repeated every three hours, with some of the Camphor mixture.

Apply a small blister to the Epigastre.

Let him have Port Wine, three ounces, in some hot sago.

Vesper.—He has taken five doses of the pills; has not vomited, and had no stool: cramps have ceased, and the shrivelled state of fingers has disappeared.

Enema Purg. statim.

℞. Extract. Colocynth. Comp.—℈ ss.
Pil. Hydrarg. gr. v.—in three Pills at bedtime.

Nov. 19*th.*—Had two free dark-green stools at night; pulse soft and weak;

he is cold, but his voice is stronger: tongue warm, moist, and slightly coated with white mucus.

℞. Calomel. ℈ ss.
Extract. Colocynth. Comp.
Asafœtidæ āā gr. v. To be taken at 6 A. M. and repeated at noon, and at 3 P.M.—Diet, tea, and three ounces Port Wine in a cup of hot sago at 11 A.M.

Vesper.—He took three doses of pills; vomits often; is colder and very thirsty; tongue cold. These unfavourable appearances are ascribed to his having drank much water, and tea; which he obtained contrary to orders. An attendant was directed to prevent his drinking.

℞. Calomel. ℈ i.
Extract. Colocynth. Comp. ℈ ss.
Opii. gr. ss. To be taken in three pills, at 6, and repeated at 10 o'clock.

Nov. 20th.—No stool, and very little change in any respect. Pulse low, weak, and soft; tongue not quite cold; he suffers from anxiety.

Habeat Enema Purg. statim.
℞. Calomel. ℈ i.—Extract. Colocynth. Comp. ℈ ss.
In pills at 7 A. M. and repeat at noon.
Give some hot sago with brandy, at 11 o'clock.

Vesper.—Had three stools, the last was black, feculent, and fluid. He is warmer; pulse improved. Has not vomited; the gums are sore.

℞. Extract. Colocynth. Comp.—Pil. Hydrarg. āā gr. v.

10 P. M.—He has had several free fluid stools; and is weaker.

Habeat statim Enema Purg.
℞. Pil. Hydrarg. gr. vi.—Opii gr. i. fiant pil. statim sumend.

Nov. 21*st.*—He has had several black fluid stools, since last report: he is now warm, and rather better; but there appears some lurid congestion of the face; pulse soft and low,

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 6 A. M.
Ol. Ricini. ℥ i. at noon.
Diet—Tea, Bread, and Sago.

Vesper.—Had four free, dark, feculent stools; has not vomited, pulse more distinct, and he is much stronger and better.

After this a slight feverish disposition remained a few days; he took a mild purgative daily, and gradually improved. Was allowed chicken and vegetables on the 25th, and was discharged on the 29th November, 1830.

CASE VII.—Stephen Drewry, Æt 31. A stout man, with a florid face, recently landed in Bengal, was seized with vomiting, and purging, and pain in his belly at 8 P. M. on the 21st May, 1827, but did not send for medical aid till daylight next morning. He was then bled to lb. i. had a blister applied to the epigastre, and took two grains of opium in solution in an ounce of mint-water, with Spirit. Ammoniæ Aromat. ʒ i. He was not seen by me till 8 A. M. on the 22d May, when he was brought to Hospital; he was then purged, and felt very weak. Ordered to take

Calomel.—Extract. Colocynth. Comp. āā gr. v. statim.
Ol. Ricini. ℥ i. at noon.

Vesper.—Had three stools, evacuations not kept for inspection; pulse 98 and small, but rather hard, and he is feverish.

V. S. ad lb. i.
℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. in two Pills at bedtime.

May 23d.—Blood not buffy; he had four watery stools during the night, the colour of ink. Pulse 102 and weak; there is still a slight flush of face.

℞. Calomel.
Extract. Colocynth. Comp. āā gr. v. at 7 A. M.
Ol. Ricini. ℥ i. at noon.

Vesper. 5 P. M.—Had five very scanty, fluid, black stools, since morning; he has now pain in the lower belly, and oppression at chest. Pulse 70, soft, and weak; tongue cool, moist, and clean.

Apply six leeches to the lower belly.
℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v.—Opii gr. ½, to be taken now.
Ol. Ricini. ℥ i. at 8 o'clock.

May 24th.—He had several scanty green and yellow stools, and has suffered severely from cramps in his legs.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. to be taken at 7 A. M.
Ol. Ricini. ℥ i. at noon.

Vesper.—The medicine has produced four stools of yellowish brown colour; tongue cool and nearly clean; pulse better; he has some cramps in the belly but none in the legs.

℞. Extract Colocynth. Comp.
Pil. Hydrag. āā gr. v.

May 25*th.*—Had three bilious yellow stools, in which many films of white mucus are floating. Has now pain in the belly, and slight morbid heat of skin. Pulse 92.

Apply 12 leeches to the belly.
℞. Pulv. Rhei. ℈ i.

After this he took a purgative dose of rhubarb, or of colocynth and blue pill almost every day, and appeared to be improving.

June 2*d.*—He was seized at one P.M. with violent pain at stomach, and spasmodic twitchings in the fingers and toes.

Pulse strong and frequent. He was bled to 20 ounces; the blood on cooling was buffy.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v.—Opii gr. i. misce—to be taken at 6 P.M.

3d.—Pain moderated, but not removed: a white tongue, and slight pyrexia; no stool.

Apply 16 leeches to scorb. cordis.
Enema Purg. statim.
℞. Ol. Ricini. ℥ iss. at 6 A. M. and repeat at noon.

Six leeches were applied on the 4th, and again on the 5th; and he took a mild purgative daily.

June 10th.—Pressure over the belly caused pain, therefore a blister was applied to the abdomen, and mild purgatives were continued till 28th June, when he was pronounced well.

The above case of gastro-enteritis, is inserted to shew how that disease, in some respects, approaches the febrile form of Cholera; but wants the rapid pulse, conjee stools, and sinking of vital power.

Case VIII.—Henry Johnson, Æt. 40, a sailor of the ship *Cæsar*, of middle size and light complexion, one month arrived from England: admitted into General Hospital at 7 a.m. 28th June 1830. Has had a purging for 48 hours and began to vomit at 2 o'clock this morning; the purging abated since 5 a.m. and he has suffered from cramps in his thighs for the last half-hour. Extremities now warm. Pulse 112 and free; tongue warm and dry. Has some chronic enlargement and induration of the liver, which can be distinctly felt.

V. S. ad ℥ xxvii.
℞. Calomel. ℈ i. statim sumend.
Ol. Ricini. ℥ i. at 9 o'clock.

Half past 10 A.M.—One cup of the blood taken at 7 A.M. is buffy, the other not; he has had two stools since admission; they are like rice-water. He complains of dreadful pain at scrob. cordis, and is crying aloud for drink; there is great anxiety. Pulse 132, fingers shrivelled, but the extremities are still warm; he voids no urine.

Repet. V. S. ad. ℥ x.
℞. Calomel. ℈ i.
Extract. Colocynth. Comp. gr. v.—misce fiant pil. ii. statim sumend.
Allowed 2 oz. of Cream of Tartar drink, every hour.

2 P.M.—Blood not buffy, had only one return of cramps since half past 10 o'clock. There is at present great anxiety; pulse 120 and soft: has had since last report, six copious watery conjee-like stools, in quantity at least 8 pints.

℞. Pil. Hydrarg. ℈ i.
Extract. Colocynth. Comp. ℈ ss.

Opii gr. i. misce et divide in pil. iv.
Two pills immediately, and repeated in two hours.

5 P.M.—By mistake the whole four pills were taken at once. He has vomited once since 2 o'clock, and had one pale-grey watery stool, with some flocculi of mucus floating in it. Belly soft and elastic. Pressure over the abdomen gives some pain. Surface generally warm; tongue warm and dry; pulse 116; he is anxious and moaning.

Apply 12 leeches to the belly.
℞. Calomel. ℈ ss.
Extract. Colocynth. Comp.
——— Hyoscyami. āā gr. iv. misce et divide in pil. ii. statim sumend.

7 P.M.—Has had one scanty, feculent, dark stool; pulse free, and there is less anxiety.

Repeat the last prescription, at 8 o'clock.

June 29*th*.—Had during the night, one watery stool, of pale grey colour; no sleep. He is now tranquil, and suffers no pain; pulse 116 and soft; tongue dry, and of morbid brownish-red colour; edge of liver distinctly to be felt; pressure gives slight pain.

Apply four leeches to the region of the liver.

℞. Extract. Colocynth. Comp. ℈ ss.

Pil. Hydrarg. gr. v. misce fiant, pil. iii. statim sumend.

Ol. Ricini. ℥ i. at noon.

Tea and thin sago allowed.

Vesper.—Had four free, feculent, fluid stools, nearly black; pulse 108; skin rather cool; he is very thirsty; has no pain except in the calf of the right leg.

Extract. Colocynth. Comp.

Pil. Hydrarg. āā gr. v. at bed-time.

June 30*th.*—Had one stool at night, which is not kept for inspection; pulse 84; tongue clean and moist at edges, but loaded, brown, and dry in the centre; skin cool; belly soft and elastic; edge of liver to be felt as before: urine copious.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. in pills at 6 A.M.
Ol. Ricini. ℥ i. at noon.

After this he took a mild purgative daily.

In a few days more, there was increased tenderness in the region of the liver; for which reason he was bled to lb. i. and leeches were applied four times: and by these means he recovered. I was informed that this man had several feverish attacks during the voyage to India; but since his arrival in Calcutta he had been in good health, and lived on shore at the Captain's house; he was a sober man, of good character.

Discharged 10th July, 1830.

Case IX.—Thomas Cavender, Æt. 30,

a sailor of the ship *Roxboro' Castle;* a stout and tall man, of dark complexion, recently arrived from England; admitted 26th October, 1830, at 8 A.M. Stated that he had been purged for three days; and worked hard in the ship's hold until yesterday. He began to vomit at 10 o'clock last night, and soon after had severe cramps in his legs and belly: the vomiting, purging, and cramps continue, and he has been purged often in the palankeen, while being brought to hospital. Pulse free and rather full, and he is warm; eyes blood-shot.

V. S. ad lb. i.
℞. Calomel. ℈ i.

10 A.M.—Blood not buffy, he is cooler and weaker; cramps moderated; the stools consist of water, of a dark-brown colour, with little feculence; pulse 96, and weak.

℞. Calomel. gr. xii.
Extract. Colocynth. Comp. gr. vi.

Ol. Menth. Pip. gtt. ii. to be taken in two pills now, and repeated in three hours.

4 P.M.—Has been purged four times; cramps returned, and he has pain in the loins; but is better in having the warmth restored, and less congestion of the eyeballs; pulse risen, and rather full. The vein was again opened and eight ounces of blood flowed.

He was very faint, and vomited after the bleeding; blood not buffy, it coagulated, but no serum separated.

R. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v.—to be taken directly—and in half an hour let him have 3 oz. Port Wine with sago.

10 P.M.—The cramps continued till half past nine; he is warm and tranquil, but very thirsty; has had two dark-grey stools, moderate in quantity.

Oct. 27*th*.—He passed a restless night, without spasms or vomiting; had much nausea, voided some urine; and had two fluid black stools, in quantity about a pint: pulse 86 and moderate; belly hot, full, elastic, and pained on pressure; tongue moist, cool, white, and very little loaded with mucus.

V. S. ad lb. i.
℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. in pills at 6 A. M.—and repeat at 10 o'clock.

Noon.—Blood buffy; he had one scanty loose dark-coloured stool, and seems better.

Repeat the pills now; and again at 3 P. M.

Vesper.—Had three free stools, and is better.

Oct 28*th.*—Had no sleep, but says he feels well; the tongue is warm, moist, and loaded with white mucus. One dark feculent stool, in moderate quantity.

℞. Extract. Colocynth. Comp. ℈ ss.
Calomel. gr. v. in pills at 7 A.M.
Ol. Ricini. ℥ ss. in Aquæ Cinnamon. ℥ i. at noon.

Vesper.—Had three dark, fluid, feculent stools; vomited the oil; suffers from pain at stomach and anxiety.

Apply four leeches to Epigastre.
℞. Calomel. gr. xii. H. S.

He was better on the 29th, but complained of some pain in head and chest, unattended with pyrexia; he took mild purgatives and had an enema which operated slightly: he passed a bad night. On the 30th October, he was feverish and had head-ache, for which reason six leeches were applied to the temples and four to epigastre: the head was shaved; and he was ordered to take

Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. in the morning.
Ol. Ricini. ℥ i. at noon—and
Extract. Colocynth. Comp.—Pil. Hydrarg. āā gr. v. at night.

9 P.M.—These medicines have produced two dark fluid stools; he is anxious, and cool; pulse low. Ordered to take

Pil. Hydrarg. gr. vi.—Opii gr. i.

He slept at night; had two fluid stools of natural colour; was cheerful and feeling well on the morning of 31st. In the evening there was some slight feverishness; and he took

Extract. Colocynth. Comp.
Pil. Hydrarg. āā. gr. v.
Opii gr. i. in pills at bed-time.

On the 1st November, he felt better and had slept, but had no stool; castor-oil or other purgative was given daily: his diet was gradually increased, and he was discharged well on the 14th November, 1830.

CASE X.—James Cawson, Ӕt. 23, a small man of light complexion, recently arrived in Bengal: ill 12 hours before I first saw him, on his arrival at the Hospital, on the evening of 7th June, 1827. He was then suffering with violent vomiting and purging, the stools a clear water, not coloured in the slightest degree; he had no cramps; face flushed; pulse 92 and regular.

V. S. ad lb. j.
℞. Calomel. ℈ i. in pills.
℞. Opii gr. ii.
Spirit. Ammoniæ Aromt. ʒ i.
Aq. Menth. pip. ℥ i. misce—to be drank after the pills.

June 8*th*.—Blood slightly buffy: he had four stools during the night, which are watery and of a pale-grey colour; he is better; tongue clammy; pulse fuller; he feels weaker, and has inclination to vomit.

Apply 8 leeches to scrob. cordis.
℞. Calomel. ℈ i.
Opii gr. ii.—misce fiant pil. ii. statim sumend.
Ol. Ricini. ℥ ii. to be taken at noon.

June 9th.—He had three stools in the course of yesterday; and three this morning.

℞. Calomel.
Extract. Colocynth. Comp, āā ℈ ss. in three pills at 6 A. M.

Vesper.—Had two very free stools, and is improving.

℞. Calomel. ℈ ss.
Extract. Colocynth. Comp. gr. v.
Opii gr. ½—to be taken in pills at bed-time.

June 10th.—Had four brown watery stools in the night, says he is well, but his face is flushed; pulse 60 and soft.

℞. Calomel.
Extract. Colocynth. Comp. āā gr. v. at 6 A.M.
℞. Ol. Ricini. ℥ i. at noon.

He took a mild aperient daily, and was gradually improving till the 21st: when he appeared feverish, had a white tongue and flushed face. Pulse 88 and full.

V. S. ad lb. j.
℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 6 A.M.
Pulv. Jalap. Comp. ℨ i. at noon.

This purged him freely; he took a purgative on the 23d, and was discharged well on the 28th.

Case XI.—Pat. Whelahan, Æt. 27, H. M. 44th Foot, recently landed in Bengal. Was seized with purging early in the morning of the 22d May, 1827; but not sent to Hospital till 10 P.M. He then had cramps in the limbs; the purging and vomiting continued, and he had some pyrexia. Pulse 92 and free; face flushed; tongue little coated with white mucus.

V. S. ad lb. j.
℞. Calomel ℈ i.
Extract. Colocynth. Comp. ℈ ss.—misce fiant pil. iij. statim sumend.

May 23*d*.—Blood not buffy, he had three copious feculent loose stools; is very weak and faint; tongue brownish and moist; cramps are still severe; pulse 98 and regular.

℞. Calomel.
Extract. Colocynth. Comp. āā ℈ ss.
Opii gr. i.—misce fiant pil. iij. statim sumend.
Ol. Ricini. ℥ i. meridie.

Vesper.—Had four scanty dark-brown stools, and vomited once during the day; he is warm and tranquil; has some pain at the navel.

V. S. ad lb. j.
Blister to the belly.
℞. Extract. Colocynth. Comp.—Pil. Hydrarg. āā gr. v.

May 24*th.*—Had four stools in the night, and he is better; still has some pain in the belly. Pulse 86 and soft; blood not buffy.

℞. Extract. Colocynth. Comp. gr. v.

May 25*th.*—Pain in the belly remains, with slight pyrexia and flushed face; pulse frequent; tongue hot.

V. S. ad lb. j.
℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 6 A.M.
℞. Ol. Ricini. ℥ i. at noon.

May 26th.—The blood last drawn was buffy, and separated a moderate quantity of serum. He was freely purged, and is much better in every respect. After this date, a small dose of rhubarb was given every morning, and he gradually improved. Was discharged on the 4th June, 1827.

In the month of May 1827, the number of cases of Cholera received into the General Hospital was 149; of whom the greater number were attacked with the disease within ten days of this man's admission.

Case XII.—Wm. Morris, Æt. 21, a middle-sized man, of light complexion, recently arrived in India, was seized with vomiting, purging, and cramps in his legs, at noon, on the 22d August 1830, which symptoms continued when he was seen at 2 P.M.; his pulse was then 102 and rather small; he was perspiring profusely, and the skin was cold, but his tongue was warm, clammy, and nearly clean; he experienced great thirst and anxiety, and felt very weak.

V. S. ad lb. j.
Capt. Calomel. ℈ i. in Pil. ij. statim.

6 P.M.—He was faint, when only ℥ xii. of blood flowed, which was not buffy when it had cooled: vomiting and purging have ceased; he has had no cramps for the last 20 minutes; anxiety remains, but his skin is warm, and he perspires less. Belly hot, inelastic and doughy.

℞. Calomel.
Extract. Colocynth. Comp. āā ℈ ss.—misce fiant pil. iij. statim sumend.
Enema Purg. statim.

8 P.M.—The Enema has produced no stool. Cramps in his legs have returned; there is increase of heat on the surface, and slight perspiration on the face.

The vein was again opened; and when 14 oz. of blood had flowed, he became faint, and the perspiration increased.

℞. Ol. Ricini. ℥ iss.

11 P.M.—He is very weak; pulse 116 and hardly to be felt; the surface is cool, and he is suffering from great anxiety; tongue warm. He has had one copious stool, of pale yellow colour.

To have Port Wine ℥ iij. with as much hot sago.

℞. Calomel. ℈ i.
Opii gr. i.—misce fiant pil. ij. statim.

August 23*d.*—Had cramps nearly all night, pulse 108 and weak, tongue clean and rather dry: he vomited once since 11 o'clock, and had a scanty fluid brown stool, not 3 oz. in quantity.

℞. Extract. Colocynth. Comp.
Calomel. āā ℈ ss.—misce fiant pil. iij.—to be taken at 6 A. M.—and Castor Oil ℥ i. at 10 o'clock.

3 P.M.—Had two free fluid stools; the belly is hot, and he has some pain below the navel. A small cup of sago allowed.

Apply four leeches to the belly.
℞. Extract. Colocynth. Comp
Pil. Hydrarg. āā gr. v.—misce fiant pil. ii. statim sumend.

9 P.M.—Pulse 106; he is free from pain, but feels very weak: has had another copious fluid stool, nearly black. Give 1½ oz. of Port Wine, with 3 oz. of thin and hot sago.

August 24*th*.—He slept, and is much better; had one stool of the same appearance as the last. Diet—tea, bread, and sago.

℞. Pil. Hydrarg. gr. v.
Extract. Colocynth. Comp. ℈ ss.—misce fiant pil. ii. statim sumend.

The above medicine produced free stools, and he was convalescent next day. A mild purgative was given daily till the 3d September, with the exception of only two days. His recovery was progressive until the 27th August: he then for the first time ate some meat, and was feverish next day: therefore a reduced diet was enjoined for several days longer.

The bad effects of premature use of animal food, were very evident in this instance. In all cases of Cholera, where febrile or inflammatory symptoms have existed, the same caution is requisite as to the food used during convalescence as in ordinary cases where patients are recovering from gastro-enteritis.

Case XIII.—George Mogg, Æt. 20, a middle-sized lad, of light complexion; recently arrived in Bengal: received into the General Hospital at 7 p. m. June 7th, 1827. Has been affected during the whole day with purging and severe cramps in the legs. Pulse feeble and frequent; skin cold; he is suffering much from pain all over the belly, and has head-ache,

V. S. ad ℥ xx.—He was ordered to take immediately.
Calomel ℈ i. in pills: and at the same time the following draught:
℞. Opii gr. ij.
Spirit. Ammoniæ Aromat. ʒ i.
Aquæ Menth. Pip. ℥ ii. misce.

June 8th.—Blood buffy, very little serum separated. He had several feculent stools in night, of light-grey colour, and feels better; but still has head-ache, and there is pain in the belly, increased on pressure; no morbid heat of skin. Pulse frequent but more free, tongue clammy.

Apply 16 leeches to the belly.
℞. Calomel. ℈ i.
Opii gr. i. fiant pil. ii. statim sumendæ.
Capt. Olei Ricini ℥ ii. meridie.

Vesper.—He has had numerous free

feculent stools, and feels better: tongue white.

℞. Calomel.
Extract. Colocynth. Comp. āā ℈ ss.
Opii gr. i. fiant pil. iij.—h. s. sumend.

June 9th.—Had one scanty mucous stool, at night. Pain in the belly continues: tongue white.

Capt. Ol. Ricini ℥ i.
Apply 16 leeches to the belly.

He took Castor Oil daily on the 10th and 11th June; on the 13th, was considered convalescent, and meat diet allowed.

On the 19th June, he was attacked with fever, and head-ache: and the bowels were not sufficiently free; pulse frequent but not very full. Diet reduced to tea and bread.

V. S. ad lb. j.
Apply ten leeches to the temples
℞. Pulv. Jalap. Comp. ʒ i.

Vesper.—Blood buffy; head easier, but he is still feverish and thirsty; he was purged five times in the course of the day.

℞. Calomel. gr. v.
Extract. Colocynth. Comp. gr. xii.
Pulv. Antimon. gr. iij.—misce fiant pil. iij.
H. S. sumend.

June 20*th.*—Vomited twice, and had eight stools at night; he is now suffering from pains in his legs and thighs; pyrexia somewhat abated.

V. S. ad lb. j.
℞. Extract. Colocynth. Comp. ℈ ss.
Calomel. gr. v. in pil. ii. statim.

June 21*st.*—Blood buffy; he was freely purged; no pyrexia remains. After this, he was purged with Castor Oil, and on the 28th June, discharged to join his Regiment. The evil consequences produced by a premature use of animal food, were evident in the febrile and inflammatory condition, which took place on the 19th June; requiring active depletion and a return to low diet.

Case XIV.—Joseph Bowdem, Æt. 19, a sailor of the French Ship *Victorine*, admitted into General Hospital 25th October, 1830, at half past 6 A. M. A slight-made lad, of light complexion; sailed from France twenty-two months ago, and has been to Peru, from whence he arrived in the river Hooghly fifteen days ago; and has been working hard in landing the ship's cargo, which is of copper. He had a diarrhœa for a fortnight, which ceased for two days, and returned last night, with the addition of cramps in his limbs and vomiting. He is now in the act of vomiting the crude remains of food. Skin covered with a cold sweat; pulse 120 and weak; tongue warm, moist, and nearly clean; he is very pale, and has some oppression at chest. The cramps are at present severe in his feet and legs.

V. S. ad lb. i.

℞. Calomel. ℈ i.
Opii gr. ii.—misce fiant pil. ii. statim sumend.

8 A. M.—He was weak and faint when only 12 ounces of blood had flowed; it is black and not buffy, but a coagulum has formed, and the serum is bloody. Has had two brown, watery stools, about lb. iss. in quantity; has not vomited; he suffers from great anxiety and desire for drink. Pulse weaker.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. misce fiant pil. iii.—to be given at 9 o'clock.

2 P. M.—Has had one scanty stool, like barley water; vomited very often; cramps have ceased. He is cold and feeble; tongue white, cold, and moist; pulse 122, and very weak. He is thirsty, and appears stupid.

℞. Calomel. ℈ i.—Pulv. Jalap. Comp. ʒ i.
Pulv. Scammon. Comp. (Ph. Ed.) ʒ ss. to be given now, mixed in treacle.

6 P. M.—Had one scanty watery stool, almost white; vomited several times, and suffers from cramps in his legs and fingers.

Half past twelve at night; he has had one pale-grey fluid stool, and vomited twice since 6 P. M. Pulse low, weak, and rapid; voice pectoral. He is torpid at times, and then lies in a restless state for a few minutes: fingers shrivelled, but there is not much perspiration except on the face; extremities cold and damp; he is certainly worse. Ordered to take three ounces of Port Wine with sago.

October 26th.—Slept after the sago and wine; he is now cheerful and warm; the tongue is warm, moist, and white; pulse stronger: he has had two stools, chiefly of a dark-grey colour, but a part of the evacuations nearly black. Diet—tea, and sago with wine.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. in two pills, to be taken at 7 A. M. and repeated at 10 o'clock.

4 P. M.—Free from cramps; the skin cold, pulse low and weak; he has had two scanty, black, paste-like stools. Repeat two pills such as ordered this morning.

Half past 9 P M.—Pulse feeble and frequent, hands cold, tongue white, cool, and moist: since 4 o'clock he has had two free fluid stools, like gruel in consistence, but black.

℞. Calomel. ℈ ss.
Extract. Hyoscyami. gr. vi. in pills H. S.

Oct. 27*th.*—Had one scanty stool, like that last reported, but has not vomited, or had any cramps: hands cold, pulse 110, and he craves anxiously for drink.

℞. Ol. Ricini ℥ i. statim sumend.
℞. Pil. Hydrarg.

Extract. Colocynth. Comp. āā gr. v. in pills,
at noon, and repeat at 3 P. M.
Diet of tea, bread, and sago, with 3 oz. of
Port wine.

8 P. M.—Had two dark fluid stools, moderate in quantity, and thinks he is better.

℞. Calomel. ℈ ss. H. S.
Madeira Wine, three ounces, with Sago.

Oct. 28*th*.—Slept; had two scanty black stools during the night: one more free evacuation this morning, of yellow colour. He is better; the hands warm, pulse feeble, and mouth slightly sore from mercury.

Ordered to take Calomel. gr. v. at 7 A. M.
Ol. Ricini—Aquæ Cinnamon. āā ℥ i. at noon.

Vesper.—Pulse improved; face livid, and eyes very dull; he has had two free loose stools, is warm, and feels better.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v.

At 9 P. M.—He was anxious, low, and colder.

℞. Pil. Hydrarg. gr. vi.
Opii gr. ss. misce fiant pil. H. S. sumend.

Oct. 29*th*.—He slept, and is better; had one stool: mouth sore; tongue moist, and coated in centre with white mucus. After this; a slight feverish condition remained for several days, and he took some purgative daily. On the 2d November, he was troubled with an eruption on the skin, resembling urticaria. Mild purgatives were continued, and his food very gradually increased.

Discharged well on the 10th November.

CASE XV.—Peter Mathews, Æt. 23, of middle size, and dark complexion; recently landed from Europe: was taken ill on the morning of 19th November, 1830, with purging and vomiting; which continued when he was admitted into General Hospital, at 5 P. M. He was then warm and had a soft free pulse, no cramps.

V. S. ad lb. iss.
℞. Calomel. ℈ i.—Opii gr. ss. statim sumend.
℞. Calomel. ℈ i.—Extract. Colocynth. Comp. ℈ ss.
Opii gr. ss. to be taken in pills at 10 P. M.

Nov. 20*th.*—Blood not buffy, and the surface of the cruor is florid; he vomited three times, and was purged often during the night; the stools are tinged with bile. Pulse 112, and very weak; he suffers from great anxiety and thirst; tongue cool, white, and dry; skin nearly cold.

℞. Calomel. ℈ i.—Opii gr. i. in pills at 6 A. M.
Diet—Tea, and hot Sago with some Brandy.

2. P. M.—No stool or vomiting since the morning. Pulse low and weak; he is cold, and sinking.

℞. Calomel. ℈ i.
Extract. Colocynth. Comp.—Asafœtidæ āā gr. v.
Ol. Cinnamon. gtt. ii. to be taken in two pills now. Sago and Brandy repeated.

5. P. M.—Had five stools, partly watery and black, partly feculent. Repeat the pills at 5 and again at 8 o'clock.

10 P. M.—Had ten free, dark, and feculent stools; perspires, and is very faint.

℞. Pil. Hydrarg. gr. vi.—Opii gr. i. in a pill now.

Nov. 21*st*.—Slept after 3 A. M. and is better; had no stool. Pulse 98 and soft. Diet—tea, bread, and sago.

℞. Extract. Colocynth. Comp
Pil. Hydrarg. āā gr. v. at 6 A. M
Ol. Ricini ℥ i. at noon.

Vesper.—Had four free, fluid, dark stools, after the oil; feels very weak; tongue cold, but the extremities are warm; pulse free and natural.

℞. Pil. Hydrarg. gr. vi.—Opii gr. i.

Nov. 22*d.*—Had more dark-grey fluid stools in night, moderate in quantity: the surface of his body is warm and pulse free; tongue continues cool, moist, and much loaded with grey mucus.

℞. Extract. Colocynth. Comp.—Pil. Hydrarg. āā gr. v.

After this, he took a purgative daily. Was feverish, and had a pain in chest on the 26th, for which he was bled, and a purgative of Jalap used. Discharged well on the 29th November.

Case XVI.—Daniel Watson, Æt. 25, a sailor of the ship *Bridgewater*, admitted 2d June, 1830, at 6 p.m. A tall thin man, of light complexion, ill two days with vomiting and purging. He is now in the beginning of collapse; pulse feeble, 96, and soft; he is covered with a profuse perspiration; vomits water, which he has just drank. Purging, a grey watery fluid. Eyes blood-shot; belly full, doughy, and inelastic; tongue clean, moist, and of morbid red colour. Has cramps at the pit of stomach now, and had cramps in the soles of his feet three hours ago.

℞. Calomel. ℈ i.
Extract. Colocynth. Comp. gr. vi.
Ol. Menthæ. Pip. gtt. ii. in two pills.

June 3*d*.—Vomited twice; and was purged five times; the circulation is more free; face flushed; the tongue of morbid red colour at edges, a little white in the centre, and rather dry; stools a conjee-like fluid, with some pale-grey powder at the bottom of the pan.

V. S. lb. i.
℞. Calomel. ℈ i.—Extract. Colocynth. Comp. gr. vi.
Ol. Menth. Pip. gtt. ii. in pills at 6 A.M.
Ol. Ricini ℥ i. at noon.

Vesper.—Has had four dark fluid stools, and he is better. Blood slightly buffy, it has separated a very small quantity of serum.

℞. Extract. Colocynth. Comp.—Pil. Hydrarg. āā gr. v. misce fiant pil. ij. statim sumendæ.

June 4th.—He has had four copious, dark stools during the night; and has now some pain in the region of the liver.

Apply eight leeches to the region of the liver.
℞. Extract. Colocynth. Comp. ℈ ss.—Pil. Hydrarg. gr. v.

June 5th.—Has had seven stools, and is better.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. at 6 A.M.
Ol. Ricini ℥ i. at noon.

After this a course of mild purgatives was followed, and he soon recovered good health.

Case XVII.—George Patch, Æt. 24, H. M. 16th Lancers, admitted into General Hospital on the 18th November 1830, in the evening. A tall thin man, of light complexion, recently landed from Europe: ill one day, with purging and slight fever; has voided no blood.

V. S. ad lb. iss.

℞. Ext. Colocynth. C.—Pil. Hydrarg. āā ℈ ss. statim.

Nov. 19*th*.—Blood florid and not buffy; he fainted when 8 oz. of blood had flowed; had six stools in night, which have not been kept; he is now cool and weak; pulse softer and natural; belly flat and hard, the abdominal muscles tense.

℞. Calomel. ℈ ss.
Extract. Colocynth. Comp. gr. v. statim sumend.
Apply six leeches to the epigastrium.

1 p.m.—One copious stool, like bar-

ley-water; eyes blood-shot, skin hot; has not vomited. Pulse 92 and free; face flushed; tongue white, moist, and warm.

V. S. lb. i.
℞. Calomel. ℈ ss.—Extract. Colocynth. Comp. gr. v. now.

Vesper.—Fainted after the V. S. The blood is not buffy; he has had two stools. The tongue is cold, moist, and white; pulse weak: he suffers from anxiety, is pale and low; and has the Cholera visage.

℞. Calomel. ℈ i.—Extract. Colocynth. ℈ ss. Opii gr. ½, now, and repeat at 10 o'clock.

Nov. 20*th.*—Two stools during the night, and he feels better; the evacuations are watery and of dark colour; the right eye is still blood-shot, and there is slight morbid heat of skin.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. at 7 A.M. and repeat at noon.

5 P.M.—He has had two stools, consisting of a dark fluid feculence; and is better.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. now, and repeat at 10 o'clock.

Nov. 21*st.*—He is improving, and has had several scanty, fluid, dark stools; surface of body warm; but the tongue is cool.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. at 7 A.M.
Ol. Ricini ℥ i. at noon.

Vesper.—Much better; three free stools.

Nov. 22*d.*—One stool in the night, a whitish mucus, not in large quantity; he is warm and seems better; more arterial congestion of right eye. Pulse soft and free.

℞ Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 7 A.M.

Vesper.—Better; two stools.

Pil. Rhei. Comp. gr. vi.

Nov. 23*d.*—Has had one free, fluid, dark stool; he is rather better.

Pil. Rhei. Comp. gr. xii. at 7 A.M.
Ol. Ricini ℥ ss. at noon.
Pil. Aloes Comp. gr. v. to be taken at bed-time.

Nov. 24*th.*—Better.

Ol. Ricini ℥ i.

Vesper.—One stool; he is gradually recovering. After this he took a purgative daily and was discharged well on the 29th November.

The morbid vascularity of one eye, in this case, was very remarkable: the left eye was slightly red on the 19th, while the right was injected with florid red blood, to a most intense degree; and continued in that state, long after the redness of the left had entirely subsided. I have seen children suffering from Cholera, with very obscure inflammatory symptoms, in whom the cornea of one eye became dull, and an ulcerated grove formed at the lower segment of the cornea; by which the humours were evacuated before death.

Case XVIII.—John Dempsey, Æt. 20, a very muscular lad, of dark complexion, recently arrived in Bengal, was attacked with vomiting and purging at 10 A.M. on the 26th March, 1826; for which he was bled from the arm, and took two small pills; but does not know their composition. His complaints continuing to get worse, and, being attended with other bad symptoms of Cholera, he was sent to General Hospital, where he arrived at 7 A.M. on the 27th March; his countenance was then sunk and ghastly (the true Cholera visage). Pulse 80, and weak; he suffered from extreme thirst, and had pains in his legs; some pain on pressing over the belly: skin cool and lax; tongue cool, clammy, moist, and brownish.

V. S. ad ℥ xx.
℞. Calomel. ℈ i.
Extract. Colocynth. Comp. ℈ ss. misce fiant pil. iii.—to be taken now, and repeated in 1½ hour.

As the patient appeared fast approaching a state of torpor from obstructed circulation, and the blood only came from the orifice in the vein by drops; 20 leeches were applied to the belly, and they filled very slowly: at the same time by pressing and rubbing the arm, the blood continued to drop from the vein for nearly two hours; and 20 ounces were collected in the cup.

At 10 A.M.—He is suffering from great anxiety and thirst; has a brown dry tongue; the extremities are cold; pulse 110 and feeble; he has not vomited or been purged since admission.

R. Ol. Ricini ℥ iss.
Aquæ Cinnamon. ʒ iv.—misce; to be taken now, and repeated at 1 P.M.

4 P.M.—Pulse more distinct, but still low and feeble; the feet are cold, tongue brown and dry: he has very little uneasiness on pressing over the belly; has neither vomited, nor been purged since he came to hospital.

Apply 30 leeches to the belly, and a large hot poultice after their removal.

R. Ol. Croton. gtt. iv.
Ol. Ricini.—Ol. Terebinth.
Magnesiæ Sulphatis āā ℥ i.
Decoct. Oryzæ. lb. i. misce, fiant enema.

6 P.M.—Much in the same state as last reported; has had two, copious, fluid, grey stools.

Capiat Ol. Ricini ℥ iss. statim.

Directed to drink 3 oz. of thin and hot sago afterwards.

Apply sinapisms to the feet.

March 28*th*.—Appears better, the anxiety and restlessness have ceased, the eyes are less sunk, and he has no pain if the belly be pressed; the extremities are warm, and pulse somewhat revived, but still low and soft. The tongue continues brown and dry, and he suffers from extreme thirst. Has had two copious, grey, feculent, fluid stools.

R. Ol. Ricini ℥ iss.

Aquæ Cinnamon. ℥ ss.—misce; to be taken at 6 A.M. and repeated at 11.

An Enema, such as ordered at 4 P.M. yesterday, is to be given at 6 A.M. and repeated at 11.

Vesper.—He had two, copious, loose, grey stools; skin warm, tongue moist and brown: pulse 110 and soft. The Cholera visage is no longer present.

Repeat the Castor Oil ℥ iss.; also the Enema as at 11.

March 29*th*.—He is easy and cheerful: pulse 98 and soft; tongue cleaner, but still rather dry, and little coated with grey mucus; had three copious stools of bright bilious yellow colour.

Ol. Ricini ℥ i. at 6 A.M.
Enema as before, to be given at noon.
Tepid Bath.

He remained feverish for several days; and required purgatives to be repeated daily, until the tongue became clean. He recovered, and was discharged from hospital on 17th April. Although this man was apparently so much oppressed and low; the pain on pressure over the belly, on admission; and the dry brown tongue afterwards: shewed the existence of an inflammatory condition, for which depletion was the only proper treatment.

The next case affords an example of the difficult and unmanageable state of disease, which exists in those cases where Cholera is preceded by a diarrhœa of several days duration. This patient shewed some signs of re-action, after being a few hours in Hospital; and his actual condition then, if abstractedly considered, might have been deemed much more favourable than Dempsey's case: but it verified the observation I have often before had occasion to make, regarding the dangerous nature of those cases, which patients denominate a common bilious attack; more especially if it occur at a time when Cholera is frequent in the vicinity.

Case XIX.—Pierre Francis Poussadore, Æt. 37, a French sailor, arrived in the river fifteen days ago, from Peru; and has worked very hard in unlading the ship, which brought a cargo of copper. Had diarrhœa for five days past: he was seized with vomiting and cramps in his legs, at noon on the 24th October, and was brought to the General Hospital at 10 P.M.; he was then in the act of vomiting, his pulse feeble, surface cold, tongue cool, skin of his hands shrivelled, respiration hurried, and voice weak and pectoral: thirst extreme.

R. Calomel. ℈ i.

Confect. Aromat. ʒ i. To be mixed with a little treacle and given directly. To take in two hours after.

Ol. Ricini—Aquæ Cinnamon. āā ℥ i.

October 25*th*.—No sleep; and no stool during the night: he vomited about an hour after taking each dose of medicine, and at two other times in the night; has occasionally cramps in the fingers and toes. Pulse 92 and free; face little flushed; skin warm; tongue rather dry and brown. He suffers exceedingly from anxiety and restlessness; voice continues pectoral, and he is quite frantic and unmanageable, calling constantly for drink.

V. S. ad lb. i.

℞. Calomel. ℈ i.

Confect. Aromat. ʒ i. to be taken at 7 A.M.

Ol. Ricini ℥ i. at 10 o'clock.

To take Sago with 3 oz. of Port Wine at 11 A.M.

Extract. Colocynth. Comp. gr. xii.

Pil. Hydrarg. gr. vi. in three pills at noon.

At 2 P.M.—The cramps have ceased. Blood drawn in the morning not buffy; circulation lowered; he had two scanty white stools like flour and water; he is cool, and says he feels himself better,

℞. Calomel. ℈ ss.

Pulv. Jalap. Comp. ʒ i. to be taken in treacle.

At 6 P.M—Had no stool; thought himself rather better, but he was colder.

At half past 12 at night, had one scanty stool, like that last reported; no return of cramp, but the pulse is very feeble, and voice pectoral; skin nearly cold, and he appears anxious, low, and weak.

To take Sago and three ounces of Port Wine.

Oct. 26th.—Slept for three hours, and says he feels much better; has no pain; tongue little furred and brown, but warm and moist.

℞. Extract. Colocynth. Comp.
Calomel. āā gr. v. at 6 A.M. and repeat at 10 o'clock.
Ol. Ricini ℥ i. at noon.
To have 3 oz. of Port Wine in hot Sago.

At 4 P.M.—Had two, black, paste-like stools; moderate in quantity; tongue brown and moist: he appears better, but is still cold.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. in three pills now.

At half past 9 P.M.—Has had a very scanty black stool, in quantity not ℥ ss. Pulse feeble and unsteady; tongue moist, brown, clammy, and cool; voice pectoral; hands shrivelled, and covered with a cold sweat.

℞. Calomel. ℈ i. in pills.
To take 3 oz. Port Wine in hot Sago.

Oct. 27*th*.—Had one scanty figured stool; not ℥ i. Pulse 110; he suffers from urgent thirst, and inclination to vomit; surface cold. He has a troublesome cough, and copious mucous expectoration.

℞. Pulv. Jalap. Comp. ʒ i.
Tinct. Sennæ ʒ ii.
Aquæ Menth. Pip. ℥ i.—misce, to be taken at 7 A.M.

Noon.—Vomited once, and had one scanty stool, like the last: he is cold, weak, and the extremities are perspiring; tongue cold, moist, and white.

Habeat Enema Purg. statim.
℞. Ol. Ricini ℥ i.
Cum Tinct. Sennæ ℨ ii.

3 P.M.—Nothing voided but the enema: tongue cold, very brown in the centre, a narrow red clean streak at its edges. Increased anxiety; he is eagerly calling for water, and at times delirious.

℞. Calomel.—Pulv.—Scammon. Comp. (Ph. Ed.) āā ℈ i.
To be taken in treacle.

8 P.M.—Had one scanty black mucous stool; says he is better, but appears weaker; surface cold, and pulse hardly perceptible.

℞. Calomel. ℈ ss.—Extract. Colocynth. Comp. gr. v.
Opii. gr. ½ in pills.—1½ oz. Brandy in hot Sago.

Oct. 28*th*, 5 A.M.—He has had one scanty stool, like tar; pulse hardly perceptible: he is quite cold, and slowly sinking; cough and expectoration very troublesome in the night.

℞. Calomel. ℈ i. in Sugar.
℞. Pulv. Scammon. Comp. ʒ ss.
Pulv. Jalap. Comp. ʒ i.
Tinct. Sennæ ʒ ii.
Aquæ Menthæ ℥ iss. misce, to drink after the Calomel.

At 8 A.M.—Indifferent and torpid; no stool. Sago and wine was given; also an injection of four pints hot water with the pump: which was repeated in an hour and brought away some flocculi of white mucus.

Died—at half past 9 o'clock.

Dissection, at 4 P. M.—Subject emaciated. Stomach and small intestines contracted, the former pale, the latter of dull lurid colour: a quantity of water in the stomach, much pale grey mucus and yellow bile in the small intestines. Colon and rectum pale, thin, and flaccid: liver slightly enlarged, soft, and a few small pale-grey patches on its surface. Much venous conjestion of the lungs, and thick mucus in the air tubes : no other disease observed.

This man belonged to the French Ship *Victorine*, and the history of the Cholera on board that vessel was most lamentable : she was twenty-two months from France, having first made the voyage to Peru; and brought a cargo of copper from thence to Calcutta, where she arrived in October. Her crew, consisting of Frenchmen, worked hard for fifteen days in landing the copper, and during the greater part of that time many of the crew suffered from diarrhœa ; which was ascribed to drinking the Ganges water, when heated at work : they had all been on shore once or oftener. Several of the men without any evident cause became suddenly much more purged before mid-day, on the 24th October, and gradually sunk into a low state, in which they derived no benefit from any of the remedies tried on board. Nine men were therefore landed: one of whom died while being carried on shore, and another was found insensible and dying when he was taken out of the palankeen at the Hospital. The rest were admitted in an advanced stage of collapse, and four more of them died of the disease. The loaded state of the mucous membrane of the bronchial tubes and air cells, was less distinctly marked in the others who died than in this case. The appearance of re-action on the 25th induced me to use the lancet, and although the force of the circulation was lowered by the bleeding, I would willingly have repeated the V. S. in hopes of giving more freedom to the circulation, but the man refused to submit to it. The progress of the sinking after the blood was drawn, though not rapid, was regular and undeviating. The general character of the attacks of Cholera on board this man's ship, was most distinctly of the low kind, tending to fatal termination with little re-action: and we are never certain of benefit from bleeding in these cases; on the contrary, we have evidence that in such forms of the disease, V. S. is very frequently injurious, and seems to shorten life.

At pages 64 and 65, I have endeavoured to point out the general character of Cholera, attended with febrile and inflammatory symptoms, such as existed in the cases that have been detailed; in which, all the worst appearances are usually moderated by the use of the lancet; and cured by a system of depletion, regulated according to the severity of the symptoms. In the foregoing cases, wherever the state of the blood which was drawn is merely reported *not buffy*, it is to be understood that there was about the usual quantity of serum separated, and that the surface of the cruor did not materially differ from the ordinary appearance of venous blood drawn from persons in health.

BLOOD-LETTING FREQUENTLY INJURIOUS IN CONGESTIVE CHOLERA.

IN almost all the foregoing cases, Blood-letting seems to have been decidedly useful; in some by removing congestion, and in many others by reducing pyrexia, and obviating early local inflammation: or by subduing the inflammation arising at remote periods. Still, to advise the use of the lancet in all cases of Cholera, would often lead to disappointment; as happened in some of the succeeding examples, in which the early collapse, and general character of disease alluded to at pages 67, 68, and 69 existed; and in which it is often difficult to procure blood from a vein. But in many of the cases where blood will flow, the system is lowered, and all the important symptoms aggravated. The fact is, that in this low form of the disease, which frequently prevails at the early stage of an Epidemic attack; we can often get as much blood from a vein, as does harm: and might almost always procure blood from the larger arteries; if the principal desideratum were simply to unload the vascular system. We are apt not to distinguish the low state, at the onset of the disease; from the collapse which supervenes on the latter stages of the febrile Cholera, when the patient dies because he was not bled early: while in the other form of the disease, he dies more quickly, because he was bled at all. We sometimes meet with cases of a mixed character, which are difficult to distinguish. The condition of the patient (Holt) in the next case, seemed fully to justify the use of the lancet; in fact the morbid sensibility of the belly on pressure, with warmth of surface and spasms; at so early a period after the commencement of symptoms of the disease, seemed to demand the loss of blood: still the first effects of the depletion were unfavorable, and its ultimate result destructive. A large proportion of the Cholera cases which commenced within a day or two of this man's attack, proved fatal, by the rapid accession of coldness and collapse.

Case XX.—W. Holt, H. C. Artillery, Æt. 20, of middle size and light complexion, recently arrived from Europe, and landed from the Ship *Thames* five days ago Admitted into General Hospital, at half-past 2 P. M. on the 20th May 1826: affected with vomiting, and a purging of a pale and almost clear watery fluid. He vomited the instant he was taken from the doolie and placed on a bed; and was then suffering from cramps in his legs: the skin was warm; pulse 122, soft and low; tongue warm, moist, and white; belly rather full and doughy, pressure over the abdomen was painful, and he complained of ardent thirst. His illness commenced at 10 A. M. with a simultaneous vomiting and purging, for which he took medicine in the Fort.

V. S. ad ℥ xx. statim.

Twelve ounces of blood flowed in a stream; the rest was obtained by pressing the arm. The vomiting recurred while the blood was flowing: at the same time the pulse sunk, and became imperceptible, and could never be distinctly felt afterwards.

A large blister was applied to the belly.

Calomel ℈ i. was put on the tongue in powder; and washed down with the following mixture.

Tinct. Opii ʒ i.—Tinct. Sennæ. ʒ iv.

An enema was ordered, composed of

Ol. Terebinth.—Ol.Ricini—Magnesiæ Sulph. āā ℥ ii.

Ol. Croton. gtt. iv.—Aquæ Tepid. ℥ x.

4 P. M.—Has vomited several times, and purged once, a watery fluid as before; he lies in a state of extreme anxiety, the surface livid and cold; fingers shrivelled, eyes sunk, and pulse not to be felt.

After this, no medicine remained many minutes on the stomach. Calomel combined either with purgatives, or with opium, was quickly rejected. The enema was repeated, and we attempted to alleviate the torpor of the venous circulation in the extremities, by keeping people constantly employed, with warmed hands, to champoo and rub the whole surface of the body. Brandy with hot water, and hot sago, were repeatedly given, and every means tried to restore the circulation, but without effect. The fulness of belly was decreased; and on pressure the gurgling of fluid in the intestines was very evident. His countenance remained ghastly and sunk, and his expressions were incoherent at eight o'clock. He died at half-past 9. It was exceedingly distressing to see a patient sink so rapidly, and the pulse fail so immediately on the abstraction of blood, as to leave no doubt that the treatment was injurious. I have seen several cases of a similar description, where the abstraction of blood decidedly did harm, in the early stage of pure congestive or blue Cholera : but in this instance, the warmth of surface, with morbid sensibility of belly when pressed, and the existing spasms, seemed to afford reasonable hope that V. S. would be beneficial.

Case XXI.—Thos. Marren, Æt. 50, a sailor of the Ship *Bridgewater*. Admitted into General Hospital, 3d June 1830, at 10 A.M. A large and muscular man, of dark complexion : was taken ill at 8 o'clock last night with cramps in his legs and belly. Vomiting and purging began at 1 o'clock this morning; and he says he was bled to a basinful (probably a pint) at 4 A. M.; but has not taken any medicine. On admission at 10 o'clock, the fingers were shrivelled; surface cold; tongue cold, clammy, and pale; eyes sunk; pulse 162 and very weak; he was exceedingly restless, and suffering from cramps in his legs and hands; vomiting and purging a watery fluid, and calling aloud for drink. The belly was flat, doughy, and inelastic.

V. S. ad ℥ xv.

℞. Calomel. ℈ i.

Extract. Colocynth. Comp. gr. vi.

Ol. Menth. Pip. gtt. ii. To be given in pills now; and repeated every hour, for four doses.

℞. Spirit. Ammoniæ Aromat. ʒ i.

Aquæ Tepid. ℥ ii.—misce, to be drank after each dose of the pills.

2 P.M.—Blood not buffy; he has had one scanty stool resembling barley-water, but no vomiting since the bleed-

ing, The pulse is not perceptible; otherwise he remains much in the same state; cramps at times violent; extremities cold.

A hot-water blister was applied to the scrobiculus cordis, and another to the centre of the spine.

No favourable symptom occurred, and he died at 5 P.M.

Dissection. — Fourteen hours after death, and 21 hours after the commencement of the disease. Venous congestion of the brain, some milky serum effused between the arachnoid and pia mater, at the upper part of the hemispheres;—and ℥ iiss. of serum in each lateral ventricle. Nearly an ounce of serum beneath the tentorium, some of which extended down the spinal canal.

An opaque patch on the anterior part

of the heart, evidently not the result of recent disease. Liver rather large, soft and unctuous, its surface slightly mottled. Two very white patches on the surface of the liver near the ligamentum suspensorium, from effusion of coagulable lymph beneath the peritoneal coat; these are each the size of half a rupee, and evidently not the result of recent disease.

Gall-bladder distended with bile of a pale dirty green colour. The cystic duct not one-fifth of the usual size, and it arose from nearly half way up the side of the gall-bladder. Omentum and small intestines very vascular; the coats of the latter, as well as of the stomach thickened, the interior of both lined with a thin pale-grey fluid, of the consistence of thin mucilage.

Case XXII.—Thomas Holme, Æt. 45, a sailor of the Ship *Bridgewater*, was admitted into General Hospital at noon on the 8th June, 1830. A stout man, of light complexion; has been drinking spirits intemperately: seized with vomiting and purging, and cramps in the legs at 4 A.M. These symptoms continue, with a flushed face, and pain in stomach and right side. Pulse frequent and full, body warm, feet cold; tongue white, moist, clammy, and warm.

V. S. ad. lb. iss.

℞. Calomel. ℈ i.—Extract. Colocynth. Comp. ℈ ss.
Ol. Cinnamon. gtt. iv. in three pills. To be taken now.

℞. Spt. Ammon. Aromat. ʒ i.
Aquæ Tepid. ℥ i. misce,—to drink after the pills.

Half past 1 P.M.—The bleeding made him faint: blood buffy, and much cupped, pain alleviated; he is cold and appears to be sinking.

Pills repeated. Hot brandy and water to be given.

Half-past 2 P.M.—Vomited once; but has had no stool.

> Repeat the pills, with addition of one drop of Croton Oil.
>
> Also let him have a purging Enema with Ol. Terebinth. ℥ ss. and repeat it in half an hour.

Half-past 3 P.M.—He had two copious, dark-green, fluid stools, after the second enema; he is now warm and more tranquil; has cramps in the feet, but has not vomited in the last hour.

> ℞. Ol. Ricini ℥ i. Ol. Menth. Pip. gtt. iv. Sacchari ℈ i.—Aquæ Font. ʒ iv. misce—to be taken now, and repeated at half-past four.
>
> Turpentine Liniment to be rubbed to the extremities.

6 P. M.—He remained easier for above an hour; and in the last half-hour has had several black watery stools, altogether three pints; he suffers from great anxiety, and incessantly calls for drink; tongue cold and clammy. Pulse 126

and weak ; cramps very urgent ; fingers shrivelled.

℞. Calomel. ℈ i.
Extract. Colocynth. Comp. gr. vi.
Opii gr. ½ to be taken in two pills now ; —and repeated at 7 o'clock.
℥ iv. Sago, and Brandy ℥ i. to be drank after the pills.

10. P.M.—Has been gradually sinking, and becoming more cold. Pulse now imperceptible ; he had one stool, the same sort as above ; has not vomited ; says his "head is light."

Repeat the pills as at 6 P.M.
Also let him have Spt. Ammon. Aromat. ʒ iss.
Aquæ Tepid. ℥ ii.—to be drank after the pills.

Died half-past 11 P. M. 8th June, 1830.

Dissection.—Fourteen hours after death. Subject stout ; eyes much sunk, and face very white.

Some old adhesions were observed in the right side of chest; both lungs sound, their posterior part very dark-coloured, from gravitation of blood. Liver large, soft, and exceedingly vascular, its surface covered with star-like patches of vascularity, like the nose and cheeks of a bon-vivant; incisions into the liver bled freely. Gall-bladder small; its coats thickened; its base adherent to the colon. Stomach thickened and pale; its interior corrugated, and covered with thick whitish mucus. Omentum and small intestines very vascular: the coats of intestines somewhat thickened, and their contents deeply tinged with dark orange-coloured bile. Veins of brain turgid; much effusion of serum between the arachnoid and pia mater—in some places this effusion very milky; ʒ vii. of clear serum in right lateral ventricle, above an ounce of clear serum in the left, and ʒ iii. beneath the tentorium: the substance of the brain was firm and tough.

Case XXIII.—James McCabe, Æt. 23, a stout man, of dark complexion; four years in India, recently arrived from Madras: having volunteered from H.M. 89th to the 3d foot; and therefore it may be presumed, he has been living in an irregular and dissipated manner for the greater part of several weeks past. Was admitted into General Hospital on the evening of 11th November, 1830. Ill five days with head-ache, and griping in the belly. Was bled to lb. iss. that night, and the blood was not buffy. In the next three days, he took two doses of colocynth with blue pill; and one dose of castor oil, which purged him freely. He was discharged well on the 15th November.

This man was seized on the next day with vomiting, after eating his dinner at three o'clock; and was sent to the Hospital at 6 o'clock p. m. on the 16th November. He was then vomiting with great violence, and constantly passing by stool a conjee-like fluid, with white flocculi: the surface of his body was cold, pulse feeble; and he had slight cramps in the legs.

V. S. ad lb. i.
℞. Calomel. ℈ i.
Opii gr. i. to be taken immediately in a pill.
Extremities rubbed with Ol. Terebinth.

Eight o'clock P. M.—Only 8 oz. of blood could be got from the veins. No change for the better; he hast just now vomited, and had a stool like conjee.

℞. Calomel. ℈ i. in pills, to be washed down with this draught.

℞. Spirit. Ammoniæ Aromat.—Tincturæ Opii āā ʒ i.

Aquæ Cinnamoni ℥ i. misce—the draught and pills to be repeated at 10, and again at 12 o'clock.

He gradually sunk into a state of insensibility, and died at one A. M. 17th November, 1830.

Dissection.—Fourteen hours after death. Much engorgement of blood at the back part and root of the lungs. Liver appeared healthy, and rather smaller than common; its edge thin, and texture of natural softness. The gall-bladder was full of green bile; its exterior covered with an adventitious membrane, apparently not of recent formation. Stomach and small intestines enormously distended with flatus, and containing much whey-like fluid, and thick white mucus. There was no bile in the duodenum. Omentum, mesentery, and mesocolon, highly vascular; small intestines in the same state, mesenteric glands enlarged,

ARTERIOTOMY IN CHOLERA.

WHEN plethoric subjects labouring under Cholera, fall early into a state of collapse, with obstructed circulation;

and we are unable to take a considerable quantity of blood from the veins; we are apt to suppose that the measure fails to afford relief, because we do not get enough blood: and it is difficult to come to a different conclusion, when we contemplate a robust and plethoric man suffering from that form of Cholera, with the face, neck, and chest purple or livid; while the patient is using great muscular exertion in respiration. But when we open a considerable artery in such subjects, and take blood as freely as we could wish: and still find our patient not relieved, we are obliged to change our opinion. Some doubt may be entertained with respect to the propriety of taking blood from an artery, in those cases, observing that the congestion and obstruction appear to be in the veins: and in taking away arterial blood, we deprive the patient of that which his system cannot again supply, so long as the decarbonising functions of the lungs are arrested: either in consequence of the disorder of the nervous system generally, or by means of a morbid coating of viscid mucus in the bronchial tubes and air cells. We are so apt to speak of the calorific and decarbonising functions of the system, as allied to each other, that perhaps I may now be ascribing too much to the latter; when I would speak of the failure of both, as among the most prominent phenomena of declining vitality, in cases of Cholera with collapse.

Case XXIV.—William Griffiths, a Gunner in the Artillery, aged 28, a stout muscular man, four years in India, invalided on account of the loss of an arm; and recently sent from his battalion to Fort William, on his way to Europe. Was taken ill with Cholera soon after midnight; the first symptoms were vomiting and purging, followed by dreadful thirst, cramps in the legs, coldness of the whole surface, and extreme anxiety.

He did not report his illness till daylight, and was then sent to Hospital, 26th December, 1829. On admission, he was quite cold, the fingers shrivelled, pulse imperceptible; tongue cold, moist, clammy, and nearly clean; the face livid; eyes sunk in the orbits; and there was much venous congestion of the eyes, giving the scleroticæ and conjunctivæ a lurid appearance. Respiration was laborious, and the chest heaving, with expression of great agony in the countenance: voice pectoral, but not very feeble. He was tossing from side to side in bed, and constantly calling for water. Cramps in the legs and arms very severe.

Twenty grains of calomel and two grains of opium were given in a pill, but immediately rejected. A free incision was made into a vein in the arm, but not a tea-spoonful of blood obtained; the jugular vein was then opened, and only a trivial oozing of thick black blood, like treacle, issued slowly from thence. These attempts to procure blood from the veins having failed, and the symptoms continuing unabated, he was ordered to take 20 grains of calomel mixed with sugar, and washed down with the following draught:

℞. Aquæ Cinnamon. ℥ iss.—Spirit Ammoniæ Aromat. Tinct. Opii āā ʒ i. misce.

These medicines were vomited up, with most violent efforts, the instant after being swallowed. The extremities and body were now rubbed with spirit of turpentine, by four men; and at the same time the radial artery was freely opened at the wrist, by an oblique incision with a lancet; the integuments being first divided down to that vessel, with a small scalpel. Blood flowed from the artery at first in a languid stream and of dark-purple color, trickling down the wrist. When about 13oz. had flowed, the blood came in a jet with arterial impulse, its colour was rather brighter red; yet not like the arterial blood of a healthy person. At this time there was no evident relief of any symptom, and the man said he was weaker. The rubbing of the extremities was continued briskly, and a finger applied to arrest the flow of blood. Some brandy with hot-water was given, which he vomited immediately; and after this he refused to take any thing but cold water: in fact he was totally unmanageable, and deaf to argument or entreaty of his friends. After the delay of about three minutes, the blood was allowed again to flow, and it came freely with a smart jet; by which and the restlessness of the patient, above 4½ oz. was spilt on the bed and floor; when lb. j. more had been received in the basin, the stream became smaller and more feeble, which was ascribed to the gradual formation of a coagulum at the orifice; but the man seemed weaker and more exhausted. Therefore the finger was again applied to the artery for five minutes. The patient was now evidently more purple in the face, his breathing more laborious, and he appeared more feeble in tossing about in bed: the voice remained pectoral, but much weaker than on his arrival at the Hospital about one hour and a quarter ago. The principal distress appeared as this time to depend on the stagnation of venous blood, and imperfect action of the lungs. The artery was again let loose; but the blood now flowed very feebly, and only 3 ounces more could be procured.

During the above treatment, this patient continued sinking; but I could not assert, that his dissolution took place more quickly than I have frequently seen in patients admitted in the same stage of disease, who had the calomel and opium treatment, with stimulants, and who were not bled. Although the blood sprung from the arm in a smart jet before a pound had flowed, and we might infer from hence that the heart's action was more free, I was never able to distinguish any pulsation in the radial artery; nor did the patient appear in any degree relieved. The blood received in three cups as above stated, was examined in half an hour; it had coagulated rather more firmly then we find the cruor of venous blood of a healthy person, its color, not materially differing in the several cups, was of rather brighter tint than the cruor of healthy venous blood. When carefully weighed, the quantity taken in the cups was found to be lb. ij. 1 oz. making together with what had been spilt in consequence of the arterial jet, and the agitation of the patient, 2 lb. 5½ oz. No serum was separated in any of the cups of blood. The patient gradually became weaker, less agitated and indifferent to surrounding objects; occasionally calling out that he had cramps in the feet or belly; no sign of reaction appeared, and he died one hour and 37 minutes after the blood had ceased to flow from the artery.

Case XXV.—Pierre Louis, a middle-size lad, of light complexion, Æt. 18, a French sailor, of the Ship *L'Indus;* was brought to Hospital at 5 p. m. on the 21st March 1828, having suffered from slight fever for six days. He began to vomit yesterday morning, and was 20 times at stool since: evacuations like water. Vomiting ceased during the night, but returned this morning, since which he has vomited three or four times, but had no stool this day, Has now severe headache and pain at scrob. cordis; pulse 108 and feeble; respiration panting and anxious; pupils dilated, bu there is no venous congestion of the eye-balls; surface of the body cool; the tongue cold, moist, and white. He is suffering from dreadful thirst. He has taken no medicine, and for two days past no food.

Apply 12 leeches to the Epigastre, and six to the temples.

Calomel ʒ ss: was given in pills: and a draught of

Tinct. Rhei ʒ iv. Aquæ Cinnamon. ℥ i.

A blister was applied to the belly, and at 6 o'clock he was ordered to take

Ol. Ricini—Ol. Terebinth. āā ℥ i. with Ol. Croton. minim ii.

At 9 P.M.—The face is livid, tongue cold, pulse at wrist imperceptible, and fingers shrivelled; the hands quite purple from stagnation of venous blood: he calls incessantly for drink. Has been once to stool, and voided from the intestines a small quantity of clear water, which has a peculiar cadaverous odour.

Repeat twelve leeches to the chest; and six to the temples.

℞. Calomel. ℈ i.—Extract. Colocynth. Comp. ℈ ss.

Opii. gr. ss.—misce fiant pil. iii. statim sumend; also let him have

Spirit. Ammoniæ Aromat. ʒ i.

Aquæ Font. ℥ i. in a draught, after the pills.

At 10 P. M.—No vomiting, nor stool; cramps very severe; thirst unabated: pulse just perceptible and very rapid. His face continues purple, and respiration laborious; the chest heaving, with intense anxiety. Seven of the leeches have filled tolerably, the rest have been pulled off by the constant restlessness and jactitation of the patient. A vein was now very freely opened, but no blood flowed. As a last attempt to mitigate the extreme agony of the patient, I made an incision down to the radial artery at the wrist; and opened that vessel by an oblique section with a lancet. The blood which first flowed was warm, and of a purple colour; it trickled down the arm for a few minutes, and afterwards started forth with a jet, and by the time seven ounces had flowed, the arterial impulse was strong and steady: the livid colour of the face had decreased, and there was less laborious heaving of the chest; but the coldness of surface remained, and there was no perceptible difference in the pulse at the wrist. Desiring to afford time to ascertain if this limited flow of blood from the artery, would be followed by acknowledged relief of respiration, and more free action of the heart and arteries: pressure was made on the orifice for five minutes, as soon as seven ounces had flowed. The patient not expressing any relief at this time, the orifice was allowed again to bleed, until seven ounces more had flowed, and after a similar pause of five minutes, the bleeding was carried to 21 ounces, besides about five ounces that were spilt on the bed and floor. The colour of the blood last drawn, was more florid than the first, but the patient did not appear to derive any benefit from the operation. He was weaker, and as it was estimated that he had lost by V. S. and leeches, above fifty ounces of blood since admission; the artery was closed with slight pressure and a bandage. The patient swallowed 20 grains of calomel in a small quantity of beer, which was the only thing he would now take: and the calomel was repeated at 11 o'clock, but not the slightest amendment took place, and he died at ¼ past 12 at night.

THE LOW FORM OF CHOLERA WITH TENDENCY TO COLLAPSE.

In the succeeding cases, we have examples of a most formidable description of Cholera, from which the patient seems to have no chance of recovery by the unaided efforts of nature. V. S. at the commencement of collapse is a dangerous experiment, which has often done harm in such cases; but we frequently succeed in saving our patients, by a careful and judicious treatment. Febrile and inflammatory symptoms are not usually observed in persons suffering from this description of Cholera; and early failure of vital energy, seems in many cases connected with profuse and frequent watery evacuations; the course of the disease tending rapidly to that stage of torpor, in which remedies produce no effect.

It is when this description of disease occurs in the cold season, that we most frequently see the short and imperfect respiration, with feeble pectoral voice, and other symptoms, indicating that torpor in the functions of the lungs, which dissection proves to be sometimes connected with a thin coat of tenacious mucus on the surface of the bronchial tubes and air cells. Among the expedients that might reasonably be tried in this form of disease; the inspiration of medicated vapours, and of nitrous oxide gas may be mentioned. In fact, the effects of remedies inhaled into the lungs, have been almost entirely neglected: they may be useful in the treatment of this formidable modification of disease.

Case XXVI.—Joseph Branch, Æt. 42,

a middle-sized man, was affected with a slight diarrhœa, on the 24th and 25th April 1826, to which he paid no attention; the purging increased, and on the 26th at daylight he began to vomit, but concealed his ailments until they were observed by one of the serjeants, and he was sent into the General Hospital at 8 P.M. he was then vomiting very frequently, and was purged every half-hour; the stools were copious and watery, and he was suffering from cramps in the toes: the pulse was soft, weak, and rapid, and he had the Cholera visage.

He was ordered to take three grains of opium in a pill, and to repeat the dose at 10 P.M.

April 27th—At 6 A.M. He is now free from cramps, vomiting and purging have ceased; he is very weak, but the pulse is soft and natural, his tongue is warm, moist and coated with a little white mucus.

℞. Extract. Colocynth. Comp.
Calomel. āā gr. v.
Opii gr. ½. — misce fiant pil. ij. statim sumend.

Ordered 3 oz. of Port Wine in Sago; and allowed Tea.

Meridie.—The vomiting and purging have returned; the stools are like rice-water; his skin is again cold, but the tongue is warm; pulse 102, soft and weak, and he suffers from slight cramps in the legs. The return of symptoms is ascribed to his having drank much water. Three grains of opium were ordered to be taken immediately, and to be repeated at 3 o'clock.

Vesper.—At 6 P. M. He has only vomited twice, and the purging is moderated; he is warmer and feels better, but complains of extreme thirst; pulse as above reported. He was ordered to take two grains of opium dissolved in half an ounce of tincture of senna, with one ounce of cinnamon water, and a drachm of Spirit. Ætheris Nitrosi.

April 28*th*—He slept and is much better; has not vomited during the night, but has had two frothy fluid stools of nearly white colour.

℞. Extract Colocynth. Comp.
Calomel. āā gr. v. ter die.

Vesper.—He has had several yellowish frothy watery stools in the course of the day, and is now suffering from nausea, and inclination to vomit.

℞. Extract Colocynth. Comp.
Calomel. āā gr. v .
Opii gr. i. misce fiant pil. statim.

April 29*th*.—He had three stools in the course of the night; they are of a light colour and frothy. There has been no vomiting. He is warm, and the circulation natural, the tongue is clean and moist.

Ordered to take twenty grains of Rhubarb, with a drachm of magnesia, in cinnamon water.

April 30*th*.—He had five stools in the course of yesterday forenoon, and had neither vomiting nor purging since: slept well, and the pulse is now natural, tongue warm and moist. After this date he took a mild purgative almost every day, until he was discharged on the 15th May 1826.

Case XXVII.—William Prosser, Æt. 27, a stout man of dark complexion, was taken ill at 1 A. M. on the 21st April 1826, and had three very copious watery stools before daylight; after which he was purged at least ten times in each twenty-four hours, and vomited as often, until the morning of the 23d. Admitted into General Hospital at 9 A. M. on the 24th April; the vomiting has ceased, but the purging continues, the evacuations resemble clear water. The extremities are cold, his belly is flat and inelastic, pulse 96 and not very weak; tongue white, moist, and warm; but the Cholera visage is strongly marked. He has had spasms in his legs which have now ceased, and he is very weak; but as the doolies were all employed, and he was anxious for immediate assistance, he with some difficulty walked to the hospital, a distance of nearly a mile.

℞. Opii gr. iii.—Aquæ Fontis ℥ i.
Spirit Ammoniæ Aromat. ʒ iss. misce.
To be taken immediately.

Vesper. He has had two stools, like barley-water; is free from spasms, but very thirsty and restless, pulse 106 and weak: the tongue is cool, and the eyes are sunk.

℞. Extract. Colocynth. Comp. ℈ ss.
Calomel. ℈ i. Opii gr. i.
Olei Croton gtt. ii. to be taken in three pills.

April 25th.—He has had five stools in the night, which are in appearance like conjee: he has been vomiting, but his pulse is not very weak.

℞. Pulv. Scammon. Comp. (Ph. Ed.)
Pulv. Jalap.—Pulv. Rhei āā ℈ i.
Tinct. Sennæ.
Aquæ Cinnamon. āā ℥ ss misce.
To be taken at 6 A. M.

At 9 A. M. he had been vomiting often but had not been purged, was ordered to take 20 grains of calomel with ten grains of compound extract of colocynth and one grain of opium.

Noon. He has vomited, and had two Cholera stools: he is now quite cold, and appears to be rapidly sinking: the pulse is feeble. Four grains of opium were given in a pill; three ounces of brandy were mixed with six ounces of hot water, and small quantities frequently taken.

At 2 o'clock he remained very low and weak, therefore 3 ounces of port wine were ordered, in hot sago.

Vesper. Vomiting and purging have ceased; he is warm, and free from spasms, pulse low.

℞. Extract. Colocynth. Comp.
Calomel. āā gr. v.—Opii gr. i.
To be taken in pills.

April 26*th.* He has had no stool in the night; appears much better, and the warmth of surface continues.

The pills ordered last night, are to be repeated three times a day.

April 27*th.* He has had one natural stool; the gums are slightly sore.

℞. Extract Colocynth Comp. gr. x.

April 28*th*. He had one stool in the night, of healthy appearance; and is nearly free from ailment. The extract of colocynth was repeated.

April 29*th*. He has been purged once; the tongue is clean and moist, and he feels well.

℞. Pulv. Rhei ʒ ss.
In Aquæ Cinnamon. ℥ i.

May 3*d*. Discharged, to proceed with his detachment up the river in boats.

This man's case appeared nearly hopeless for thirty-six hours after admission into Hospital. I have never known so much opium required to check purging and vomiting, in any other case, which ultimately recovered. It is probable that eleven grains were retained in the stomach, from the time of his admission into hospital, up to the evening of 26th April, including a period of about sixty hours.

Case XXVIII. John Simms, Æt. 24, of small size and light complexion, six years in India, an artillery-man, was taken ill at 7 p. m. on the Battery guard, and sent to hospital at 9 o'clock, affected with purging, vomiting, and cramps in his legs: the pulse at wrist had ceased before he reached the ward, and the surface of the body was quite cold; his tongue was cold, voice pectoral, and he was suffering from thirst to such a degree as to be indifferent to everything but the desire to drink, hardly giving any answer to questions.

Twenty grains of calomel were given in powder, and washed down with a draught composed of

Spirit. Ætheris Sulphuric.
Tinct. Opii āā ʒ i.

Oleum Cinnamon. gtt. iv.
Aquæ Fontis ℥ i.

The calomel and draught were repeated in an hour.

At half past 10 o'clock, he was cold and insensible; respiration heavy and laborious; vomiting had ceased. Died at 11 P. M. 14th November, 1830.

Dissection—Nine hours after death: stomach externally paler than usual, internally towards the pylorus of a pink colour, and much contracted. Small intestines of a pale pink colour, their coats thickened and pulpy, as if from serous effusion between their membranes: their interior filled in some parts with great quantities of conjee-like fluid, in other parts with mucus as thick as paste; the last foot of the ilium was quite empty, contracted and dry: no bile in the duodenum. No other morbid appearance observed.

Case XXIX.—A medical man, 26 years of age, of slight make and delicate constitution, recently arrived from England, had a severe attack of spasmodic cholic, within a few weeks after landing in Bengal: the constipation attending this disease was most obstinate, and during the treatment he was twice largely bled from the arm, and leeches were repeatedly applied to his belly. After various purgatives had failed, the obstruction of the bowels was removed by large enemas given with the pump. He remained in the course of a tardy convalescence for six days more; using little mild purgative medicine, and observing the greatest caution as to his food, but gaining strength so slowly, that on the evening before the attack of Cholera, when some friends asked how he was, he said this was the first day since his illness, that he really felt an increase of strength. At 9 p. m. on the 27th October 1830, he was affected with a purging, the stools copious, watery, and of a pale-yellow bilious tinge. He did not send for advice till next morning, not suspecting Cholera; he had then sunk into a state of collapse, affording no hope of recovery; though he had not vomited, and had no spasms. Occasional attacks of vomiting took place during the course of the day, and he died in the afternoon. We had some bad cases of Cholera in the Hospital at that time, but the patient had not left his room for near three weeks. The disease was also occurring in Calcutta.

Case XXX.—Thomas Price, Æt. 32, a stout man, of H. M. 38th Foot, arrived from England on board the ship *Buckinghamshire*, and landed on the 2d June. Admitted into General Hospital at 10 P. M. 14th June, 1827. Has been purged for two days past, but did not begin to vomit until he was put into the dooley to be brought to Hospital. Is at present vomiting, and purged incessantly, and suffers from distressing thirst. Pulse 106, and hardly perceptible; surface of the body as well as the tongue cold.

℞. Calomel. ℈ i.
Opii gr. ii. misce fiant pil. ii. statim sumendæ.
Apply a blister to the scrobiculus cordis.

11 P. M.—Purged twice; evacuations, a pale greenish water: he is constantly vomiting; tongue cold, moist, and clean; great anxiety and thirst.

℞. Calomel. ℈ ss.
Opii gr. ii. misce fiant pil. statim sumend.
Apply Sinapisms to the feet.

June 15*th*.—Vomited only twice, and purged five times since last report; evacuations watery, and of pale-green colour: he is much better, and quite composed; tongue warm and moist, but little furred; pulse 108 and weak. Some sago and wine allowed.

℞. Calomel. ℈ ss.—Extract Colocynth. Comp. gr. v.
Opii gr. ½—misce fiant pil. ii.—to be taken at 6 A. M. and repeated at 10 o'clock.
Ol. Ricini ℥ i. at noon.

Vesper.—He is better, and warm; had four stools but no vomiting. Pulse 112 and weak.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v.
Opii gr. i. misce fiant pil. ii. H. S. sumend.

June 16*th*.—Has had frequent, brown, watery stools; and much nausea in the night. Pulse 98, face flushed.

℞. Pil. Hydrarg.—Extract Colocynth. Comp.
āā gr. v.

June 17*th*.—Had five stools, a slight degree of pyrexia remains. Pulse 98; skin warm; tongue swollen and fissured.

℞. Extract Colocynth. Comp.
Pil. Hydrarg. āā gr. vi. in pills, at 6 A. M.
Ol Ricini ℥ i. at noon.

By these medicines he was freely purged, the evacuations were of dark colour, and he was much better. Castor oil was administered daily, and he was discharged well on the 20th June.

Case XXXI.—Mrs. Ann Holt, Æt. about 24, landed from England on the 12th May, 1827, and was troubled with vomiting almost every day till the 18th, when I first saw her, at 11 P. M. Her pulse was then 104 and weak; tongue cold; she had been vomiting, and purged violently since dark; and her extremities were cold.

℞. Calomel. ℈ i. in pills.
℞. Opii. gr. ii.—Spirit. Lavand. Comp.
Spirit. Ammoniæ Aromat. āā ʒ i.
Aquæ Menth. Pip. ℥ i. misce,—to be drank after the pills.

May 19*th*.—She has not vomited since

taking the medicine; was purged three times; evacuations copious, like rice-water, with a light slate-coloured sediment: tongue warm, moist, and white; face somewhat flushed, pulse 108, and weak; extremities warm.

Apply eight leeches to the temples.

℞. Pulv. Rhei. ℈ i.

Aquæ Menth. Pip. ℥ i. To be taken at 6 A. M.

Ol. Ricini ℥ i. at noon.

Tea and Sago allowed in very small quantity.

1 P. M.—Vomited six times, but the castor oil was not rejected: purged four times; stools copious and of a pale-grey colour, as fluid as water; tongue cool, moist, and white. Pulse 132.

℞. Pil. Hydrarg. gr. v.

Extract Colocynth. Comp. ℈ ss—misce fiant pil. iii. to be given at two o'clock.

6. P. M. No vomiting; she has had six feculent black stools; tongue warm,

and very much loaded with white mucus.

℞. Ol. Ricini ℥ i.—Tinct. Opii gtt. v.

Half-past 10 P. M. She vomited the oil: had two, copious, watery, bronze-coloured stools. Tongue warm, moist, and white.

℞. Extract. Colocynth. Comp.—Calomel. āā gr. v.
Opii. gr. i.—misce fiant pil. statim sumend.

May 20*th*. Slept, and had one green bilious stool; no vomiting.

℞. Extract Colocynth Comp.
Pil. Hydrarg. āā gr. v. at 6 A. M.
Ol. Ricini ℥ i. at noon.

4 P.M.—She has vomited the pills and oil; had two watery black stools; the tongue is warm, and loaded wth white mucus.

R. Pulv. Rhei ℈ i. Aquæ Cinnamon. ℥ i.

6 P. M.—Had one stool, and has not vomited; says she is better.

Ordered to take some Sago and Wine.

May 21*st*. Had no sleep; has been purged, and vomited often in the night, stools a reddish bronze-coloured water; tongue cool and moist; pulse 116 and soft.

℞. Opii gr. i. statim.

May 22*d*. Was tranquil, and feeling remarkably well all yesterday, therefore no medicine was given in the evening. During the night she vomited occasionally, and had two copious bronze-coloured stools; pulse 98 and soft.

℞. Extract Colocynth. Comp. ℈ ss.
Pil Hydrarg gr. v.—misce, fiant pil. iii. statim sumendæ.

She was purged freely by these pills, and is much better in every respect. She had no return of unfavourable symptoms: some mild purgative was continued daily till the 29th, when no further treatment was requisite.

Case XXXII. Jas. Beck, Æt. 19, a slight made lad, of light complexion, a sailor of the ship *Resource*, recently arrived from sea. Was attacked with Cholera, and profuse purging, on the 11th October, 1827, and in consequence of extreme coldness of the extremities, water was applied by his messmates, so hot that the skin was blistered on one foot, and also at the elbow. I could not ascertain what other remedies were used: and no cause could be assigned for the accession of the disease.

On the 12th, the most distressing symptoms were cramps in the legs, and purging. He was sent to the Hospital at 5 p. m. on the 13th October; suffering from cramps in his legs, anxiety, and great thirst: he had a cold tongue, although the extremites were now warm; pulse 116, soft and feeble; and there was pain at scrob. cordis. The eyes were glazed, and suffused with florid or arterial congestion, the face was somewhat flushed. He now vomited immediately every fluid that was swallowed, but had only been purged four times since the morning. Some of the existing symptoms might have authorised V. S. but the use of the lancet was at the present stage of the disease, deemed hazardous, in consequence of the long continued and profuse purging, feebleness of pulse, and coldness of the tongue; for although the extremities had been blistered by boiling water, the temperature of the body was not uniform.

Eight leeches were applied to the temples.
A blister was put to the scrob, cordis; and
Calomel. ℈ i.
Opii gr. i. were given in a pill immediately.

9 P. M.—No return of vomiting or purging since 5 o'clock; the leeches bled profusely, whereby the flush of face and redness of eyes are diminished; he suffers less from thirst, and the tongue is warm, but pulse continues 116, weak and low; cramps in the legs have ceased.

℞. Calomel. ℈ i.
Opii gr. i.
Extract. Colocynth. Comp. gr. v. in three pills.

11 P. M.—Thirst subsided, no vomiting or purging since admission.

Ol. Ricini ℥ ii.

Oct. 14*th.*—Vomited once, and purged three times; the stools are as black as ink, and scanty; he feels much exhausted; the pulse 104, soft and weak, but face slightly flushed.

℞. Extract Colocynth. Comp.
Pil. Hydrarg. āā gr. v. in two pills at 7 A. M. and repeat at 11.

Ordered to take Ol. Ricini ℥ i. at 3 P. M.
Diet Tea, and thin Sago, with 3 oz. Port Wine.

Vesper.—He has vomited twice, a pale watery fluid, nearly transparent.

7 P. M.—Had five stools, which are rather scanty, and of a very dark bottle-green colour; pulse 98, soft, and weak; tongue quite cold, soft, clean, and moist.

℞. Extract Colocynth. Comp.
Pil. Hydrarg. gr. v.
Opii gr. ss. in two pills at 7 P. M. and repeat at 10.

Oct. 25*th.*—Had four copious, dark, watery stools; did not vomit in the night; suffers anxiety, but no head-ache; eyes still suffused.

Capiat Ol. Ricini ℥ i.

Vesper.—Vomited once, and purged four times during the day, evacuations partly of a yellow colour. Pulse 98, soft, and natural; tongue continues quite cold.

After this date, he had mild purgatives repeatedly, and was discharged well on the 12th November, 1827.

Case XXXIII.—Mrs. Mary Ann Kelly, Æt. about 24, a soldier's wife of the 44th Regiment, received into General Hospital at half-past 9 P. M., May 19th, 1827: states that she was seized with extreme sickness at 1 o'clock last night, (20½ hours ago,) at first she vomited and was purged about once an hour, but lately purged every minute; and she appears exceedingly exhausted.

℞. Calomel ℈ ss.—Opii gr. i. statim.

Half-past 10 o'clock. Has cramps in her legs, great anxiety, and thirst; pulse 132 and not very weak; tongue warm. Neither vomited nor purged since taking the pill.

℞. Calomel. ℈ i. in a pill,—to be washed down with a draught of

Spirit Lavand. Comp.
Spirit Ammoniæ Aromat. āā ʒ ss.
Aquæ Menth. Pip. ℥ i.

May 20*th*. She has slept, the cramps have ceased, and she feels better: pulse 86; had one scanty green stool.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 6 A. M.
Ol. Ricini ℥ i. at noon.

4 P. M. No stool nor vomiting; cramps in the legs have returned.

℞. Ol. Ricini ℥ i.

6 P. M. She is quiet, and easy; had no stool.

Repet. Ol. Ricini ℥ i.

Half-past 10 P. M. She remains tranquil, and is much better; had two dark watery stools.

May 21st. Had one black watery stool in the night, with some lumps of fæces; pulse good, and skin warm; she feels weak.

℞. Pulv. Rhei. ℈ i. in
Aquæ Cinnamon. ℥ i.

Vesper. She has been freely purged, and is better. Mouth sore.

May 22d.—Had one stool, consisting of films of mucus in yellow bilious matter. After this date she used rhubarb as an aperient, and was discharged well on the 8th June.

CASE XXXIV. John Fergusson, Æt. 23, a sailor of the Ship *Euphrates*. A middle-sized man, of dark complexion, arrived in the Hooghly ten days ago, from Europe; has not been on shore, but he and the rest of this ship's crew have been exposed to the sun, and worked hard for some days past in getting up the anchors, &c. the ship having met unusual difficulties in coming up the river. Admitted into General Hospital a quarter before 10 A. M. 18th June, 1828.

Has had a purging for five days, and began to vomit at 1 P. M. yesterday; says he has had fifty stools, like pure water, since that hour. Is now suffering from great anxiety, thirst, and cramps in the belly: face flushed; pulse low, and oppressed; tongue cool.

Apply twelve leeches to the temples.
℞. Calomel. ℈ i.
Opii gr. ii.—misce, ft. pil. ii. statim sumend.

Noon. No vomiting or purging; excessive thirst. Pulse 114, and weak; face still flushed.

℞. Extract Colocynth. Comp.
Calomel. āā ℈ ss.—misce, fiant pil. iv. statim sumend.
Habeat Enema Purg. cum. Ol. Terebinth ℥ ii.

2 P.M.—Vomited twice, and had three stools, of pale grey colour. Pulse 114, weak, and oppressed. He seemed to be sinking; and therefore was ordered a small quantity of sago, with Madeira wine.

5 P.M.—Pulse more free; face flushed; has pain at the navel; he feels warm and better, and the tongue is warm, but he is suffering from great thirst.

Apply sixteen leeches round the navel.
℞. Pil. Hydrarg. gr. vi. statim.
Cream of Tartar drink 4 oz. at a time.

June 19*th*.—Vomited once this morning, and had two scanty watery stools, of grey colour. He is restless and very thirsty; face flushed; pulse 106, soft, and natural; tongue warm and moist.

Apply sixteen leeches to the nucha.
℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v.
Opii gr. $\frac{1}{2}$—misce, fiant pil. ii. statim sumend.

Ol. Ricini
Aquæ Cinnamon. āā ℥ i. to be taken at noon.

3 P.M.—Vomited several times after taking the pills; and the oil was quickly rejected; he has had two black, fluid, feculent stools. Is weak, and anxious; and has been tossing about in bed all day.

Ordered to take Pil. Hydrarg. gr. vi. immediately.

A small quantity of sago and wine was given an hour after the pill.

9 P.M.—He feels much better: has had two black watery stools.

Repeat the Blue Pill.

June 20*th*—He slept little; has had no stool during the night: one scanty brown stool this morning: lies on his back, in a state of great anxiety; there is slight tension of belly, and some tenderness on pressing over the abdomen; tongue moist, and white. Pulse 108.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 6 A.M.
Ol. Ricini ℥ i. at noon.

Vesper.—He vomited some of the castor oil, with bile: had three black watery stools, and feels better.

℞. Pil. Hydrarg. gr. vi.
Opii gr. ss. in a pill at 8 P.M.
Allowed Cream of Tartar drink.

June 21st.—He has had no stool or vomiting during the night.

℞. Extract. Colocynth. Comp.
Pil. Hydrarg. āā gr. v. at 6 A.M.

Vesper.—Has had no stool, and says he is well; tongue warm and moist.

℞. Pil. Hydrarg. gr. v.—H.S.

June 22d.—No stool; says he is well, and hungry.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v.—misce, fiant pil. iii. statim sumend.

These pills had no effect until they

were assisted by a purgative enema, and then he had four stools. Had a few mild purgatives after this, and was discharged well on the 1st July.

Case XXXV.—Edward Enderson, Æt. 30, an emaciated man of light complexion; a sailor of H.C. Frigate *Hastings;* six years in India. Admitted into General Hospital 13th February 1826. Has been ill for above two months, with quotidian intermittent, enlarged spleen, and general debility. Bowels free; tongue moist.

Was ordered to be purged daily, with compound extract of colocynth; of which five grains only were given at bed-time; and he took two grains of quinine in solution in two ounces of water, with six drops of aromatic sulphuric acid, daily at 6 A.M. and the same dose was repeated at noon.

Feb. 19*th*.—There has been no return

of ague, and his appearance is more healthy; spleen smaller.

Quinine omitted.—Comp. Ext. of Colocynth. continued.

Feb. 20*th*.—Was attacked in the night with vomiting, purging, and dreadful cramps in the muscles of legs, and belly; but made no report of this illness till daylight, when he was observed to have the sunk ghastly visage, and hollow eye, peculiar to Cholera; the pulse at that time was not very low, the limbs and tongue not quite cold: but his appearance was exceedingly altered.

℞. Calomel. ℈ i.
Opii gr. iii.—misce, fiant pil. ii. statim.
A blister was applied to the scrob. cordis.
Brandy and hot-water each 1 oz.—ordered to be taken now, and repeated in an hour.

The appearance of Cholera subsided in the course of the day, and the next morning he was ordered to take

Magnesiæ ℈ ii.
Pulv. Rhei
Pulv. Jalap. āā ℈ i.
Aquæ Menth. Pip. ℥ iss.—to be repeated in six hours, if the first dose should not operate freely.

Feb. 22*d.*—Purged freely by the first dose of medicine.

He recovered under the use of aperient medicine frequently repeated.

Case XXXVI.—Mrs. Brannigan, Æt. 30, a small and thin woman; was seized at midnight with purging, vomiting, and cramps in the legs; and sent to General Hospital at 6 A.M. on the 23d May, 1827. The commencement of collapse was at that time evinced by extreme prostration of strength, sunk eye, coldness, and a weak pulse at 120: the tongue was cool, moist, and nearly clean; voice feeble and pectoral. She had not taken any remedies.

℞. Calomel. ℈ i.
Opii gr. ii. to be taken in pills immediately.
Apply a blister to the scrob cordis.

At 8 A.M.—She had vomited twice, but not rejected the pills; had two stools, quite white, like magnesia and water; in other respects no change since admission: she has occasional cramps in the legs.

℞. Calomel. ℈ i.
Extract. Colocynth. Comp. ℈ ss.
Opii gr. i.—misce, ft. pil. ii. statim sumendæ.
To take Ol. Ricini ℥ i. at 11 A.M.
Some sago with port wine to be given two hours after the castor oil.

Vesper.—Has had several stools: the pan of the night-chair is nearly full of dark-brown water: surface of the body, as well as the tongue, warm. Cramps ceased, and the pulse free.

℞. Pil. Hydrarg. gr. x.
Calomel. gr. iv.
Extract Colocynth. Comp. gr. vi.

Opii gr. i.—misce et divide in pil. iv.

Two pills to be taken at 6, and two at 9 o'clock P.M.

May 24*th*, 2 A.M.—Has had several feculent stools, of brown colour. Extremities and surface generally warm, tongue dry and hot, the pulse has risen.

℞. Extract. Colocynth. Comp.

Pil. Hydrarg. āā gr. v.—misce, fiant pil. ii. statim sumendæ.

These pills had produced several dark-grey copious feculent stools before 7 A.M. the patient was then suffering from hiccup, but was free from other unfavourable symptoms; pulse 84 and soft; tongue warm, moist, and little white.

This patient recovered slowly, and required great care; being twice during her convalescence affected with dysenteric symptoms; and then she passed some blood with her stools. She used mild purgatives for many days, and left Hospital on the 25th June, to proceed in a boat to Chinsurah with her husband; being still very weak.

This woman was nursing a child about six months old, when she was seized with Cholera: she would not be separated from the infant, which remained in the bed crawling over its mother when she was suffering severely from the cramps. While the bad symptoms of Cholera existed, no milk was secreted; but during convalescence the flow of milk returned, and after an interval of twelve days the mother nursed her child again, on the 5th June.

If Cholera were very liable to be contracted by personal communication, this child was exposed to its influence in the highest degree, but shewed no sign of ailment.

Case XXXVII. John Berrigan, Æt.

19, rather a slight made man, with thin face, and red nose: recently arrived in Bengal: was admitted into General Hospital, on the 21st February, 1826, for a cough of two weeks duration. He was well on the 1st March, and would have been discharged next day, but he was attacked at 4 A. M. 2d March, with watery purging, and was twenty times at stool before half-past 7 A. M. The eyes were then sunk, the countenance was anxious, and he suffered from dreadful thirst, had a white moist tongue, and the skin was moderately warm. He spoke of having pain in the belly, but rude pressure over the abdomen was borne without complaint.

℞. Opii gr. ii. statim sumend.

Apply a blister to the Epigastre.

Allowed brandy ℥ iii. with hot water ℥ vi.—to be given in small quantities.

Ordered a flannel dress.

Half past 8 A. M.—The brandy and

opium were quickly vomited, and he is becoming colder and lower. Pulse very feeble, purging continues.

℞. Tinct. opii—Spirit. Æther. Sulph. āā ʒ ss.
Ol. Cinnamon. gtt. v.
Aquæ Font. ℥ iss.—misce, to be taken now.

11 A. M.—Much nausea and anxiety, with dreadful distress from thirst, continue; but the purging has ceased; his extremities are warm, and there is an equal general perspiration over the surface.

℞ Extract Colocynth. Comp.
Calomel. āā ℈ ss.
Camphoræ gr. ii.—misce, fiant pil. iii. statim sumend.

Vesper.—Had no stool since 8 A. M. he suffers much from thirst.

Habeat Enema Purg. cum. Ol. Terebinth. ℥ ii

March 3d.—Had no stool: he is suffering from great anxiety, but his pulse is soft, even, and moderate.

Enema Purg. cum. Ol Terebinth. ℥ ii.
℞. Pulv. Jalap.
Pulv. Rhei. āā ℈ i.—Magnesiæ. ℈ ii.
Aquæ Menth. Pip. ℥ ii.—misce, to be taken at 6 A. M.

March 4th.—He has been freely purged, the stools are black and feculent; the circulation is free, and all bad symptoms have ceased,

Repeat the purgative as yesterday.

A slight feverish disposition remained after this, which required a repetition of mild purgatives almost every day, till he was discharged from Hospital on the 17th April, 1826.

CASE XXXVIII.—Joseph Cocket, Æt. 19, a middle-sized lad, of dark complexion, a sailor of the French Ship *Ma-*

gellan, arrived in the Hooghly twenty days ago; went on shore on the morning of 13th December, 1829, and was soon after seized with purging, which continued all day; but he paid no attention to it, and took no medicine. In the course of the night he became weaker, and had spasms in his legs: finding himself very ill on the morning of the 14th, he desired to be sent to Hospital, but did not arrive there till a quarter past twelve at noon. The stage of collapse was then established; the surface was cold, the fingers were shrivelled; pulse at wrist hardly perceptible; voice feeble, tongue cool, purging and vomiting had ceased: he was drowsy, and did not appear to suffer pain. Torpor and death were evidently approaching, but we were unwilling to abandon the man while he was breathing; therefore an attempt was made to excite action by stimulants. A blister was applied to the scrob. cordis, and sinapisms to the feet, the limbs were rubbed diligently with spirit of turpentine. Twenty grains of calomel, with two grains of opium, and two drops of croton oil were given in pills; and enemas with oil of turpentine were given at 2, and repeated at 4 P.M. These remedies had no effect. The galvanic pile had been in the meantime prepared, and when it was acting so strongly as to have a powerful effect on several healthy persons, who with myself tried it; shocks were passed through the patient's arms, chest, diaphragm and liver; and the galvanism was directed so as to pass through the situation of the great solar plexus of nerves: but he shewed not the least symptom of feeling its influence. Those persons in health, who touched the wires after we had ceased to apply them to the patient, received severe shocks.

Calomel. ℈ i. with Extract. Colocynth. Comp. gr. vi.

Ol. Croton. gtt. ii. were given in pills at 6 o'clock.

The patient died at half-past 8 P. M. 8¼ hours after admission.

On dissection—11½ hours after death, we found extreme venous congestion of the brain and lungs; the auricles of the heart, and great veins of the chest and abdomen, were exceedingly gorged with blood. Liver soft, and of darker colour than usual; gall-bladder somewhat flaccid; bile of lighter colour than natural; spleen small and soft, adherent to the adjacent parts; the adhesions apparently not recent. Slight morbid vascularity of the omentum majus, and of exterior of stomach: interior of stomach covered with thick paste-like mucus, on scraping off which, much general redness of the mucous membrane was seen. The small intestines distended with flatus, and a fluid resembling thin gruel; they were exceedingly vascular, and of florid red colour, their lining membrane much corrugated. There was some morbid vascularity of the great intestines; many of the mesenteric glands enlarged, but not inflamed. Much emphysema of the cellular structure, about that part of the duodenum which approaches the right kidney, was observed.

Although mercury is found so useful in the treatment of Cholera, especially in its febrile form; it will not prevent the accession of the disease, even if taken to such an extent as to produce salivation, of which the two following cases are examples; and I have known several other instances where persons in a state of salivation, have been attacked with the worst descriptions of Cholera, with collapse.

Case XXXIX.—James Day, Æt. 29, sailor of the Ship *Norfolk*. Had ulcers at the orifice of the urethra, for which he took mercury on board ship, and the mouth was sore : a looseness of the bowels became troublesome for two days, and therefore he was sent on shore, to the Hospital, in the evening of the 20th March, 1828. There were then no symptoms except those of common diarrhœa, but he was very thirsty ; the pulse was good ; tongue white but moist. He was directed to take some castor oil.

About midnight he began to vomit, and was attacked with cramps in the legs and arms. He did not make these symptoms known till day-light, when he was found in a state of extreme exhaustion, having been at stool fourteen times, and the pan of the night chair was filled with a conjee-like fluid. There was morbid sensibility at scrobiculus cordis ; pulse 96 and soft ; tongue moist, warm, and white. Twenty grains of calomel, and two grains of opium were given ; and a blister was applied to the epigastre. Calomel, colocynth, and blue pill with a small quantity of opium were afterwards taken. Vomiting and purging ceased before 11 A.M, ; but cramps, thirst, and anxiety continued, attended with increasing coldness, which continued till he died at 2 A.M. next morning.

CASE XL. William Shannon, Æt. 35, an emaciated man, came from England in the Ship *Herefordshire* : and had intermittent fever for two months during the voyage, for the cure of which disease he was salivated, and the mouth remained sore when the attack of Cholera came on. He landed on the 16th May 1827. His bowels were very costive on the 20th ; and he was, without any known cause, taken ill with symptoms of Cholera at 5 A. M. on the 21st. He was then bled to ℥ xiv. and took two grains of opium dissolved in water. At half past 9 A. M. he was sent to Hospital in a state of collapse ; and died at a quarter past 3 P.M.

Case XLI. John Brown, Æt. 22, a sailor of the Ship *Moira:* a stout man of light complexion, arrived from England, ten weeks ago; he was on shore all yesterday, but returned to his ship at 8 o'clock in the evening, and was taken ill at 11 P.M. with vomiting and purging, attended with cramps in his feet: for which he was bled in the night, and took some brandy, with a medicine, the nature of which he does not know. As he seemed to be in a dangerous state, he was landed and sent to the General Hospital, where he arrived at 3 o'clock P.M. 20th February, 1832. He was then suffering from great anxiety, and pain in the head, loins, and epigastre: the peculiar expression of countenance indicative of Cholera was present in a very marked degree, there was a livid circle round the eyes, and his fingers were shrivelled; but the pulse was tolerably free, face flushed, and surface warm, although the tongue was cool. The pupils were dilated, and he was thirsty, but not calling anxiously for drink. He was ordered to be bled immediately, but only ten ounces of blood could be got from the vein: it appeared black as it flowed; on being left at rest, a small quantity of bloody serum separated; and the cruor was very soft, and black. He was ordered to take

Calomel. ℈ i. in pills, and a draught of
Tinct. Opii gtt. xx.
Aquæ Cinnamon. ℥ i.

At 4 P.M.—He is much weaker, and his face is more livid. the hands are still warm, and he is not suffering from spasms; pulse 132, and much more feeble: he suffers from increased anxiety, and at times lies in a torpid state for a few minutes.

Apply a blister to the Epigastre and another to the spine.

℞. Liquor. Ammoniæ Puræ ʒ i.
Aquæ Cinnamoni ℥ iiss.—misce, to be taken

immediately; after which, let him have brandy, 3 ounces, in hot sago.

At 5 P.M.—There is slight increase of warmth, but no other favorable symptom; his pulse continues rapid and weak, there are cramps in his legs at present, and he has occasional nausea, but has neither vomited, or been purged since admission.

Apply sinapisms to the feet.

Liquor Ammoniæ to be repeated at 5, 6, 7, and 8 o'clock.

At 9 P.M.—He is weaker, and colder; the voice is feeble, pulse 132 and weak; he has had no vomiting or purging.

Let him have 3 ounces of brandy with hot sago.

Apply a large mustard plaster across the lower part of the chest.—The Liquor Ammoniæ to be repeated every hour till midnight; after that, every second hour.

February 21*st*, at 6 A.M.—He has had

a restless night, with constant distressing nausea, but he has not actually vomited, nor has he been purged. The voice is stronger: pulse 114, but very weak. His tongue is warm, and he says the pain at the epigastrè and in the loins has ceased. The mustard plasters have blistered his feet; and the blisters which were applied yesterday had commenced to vesicate, when he pulled them off in the night.

℞. Extract. Colocynth. Comp.—Pil. Hydrarg. āā ℈ ss.

Ol. Menth. Pip. gtt. ii. to be taken in pills at 6 A.M. and repeated at 8 and 10 o'clock.

Ol Ricini ℥ iss. to be given at 12, and repeated at 2 o'clock.

At 5 P.M.—He has had no stool, and has not vomited; there is now an uniform warmth of the extremities, the pulse is 104 and soft, the tongue moist and warm. He is free from pain, and the voice is much stronger; but debility continues to such degree that he cannot raise himself in bed without assistance; he has slept for two hours this afternoon. A purgative enema was ordered at 5 o'clock, and repeated at 7, by which a considerable quantity of dark-coloured watery fluid, of a feculent smell, was brought away; the lurid colour of the face is much decreased. Hot sago with three ounces of brandy allowed.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v.
Olei Menthæ Pip. gtt. ii. to be given in three pills at 10 o'clock, and repeated at midnight.

Feb. 22*d*.—He slept little; the pulse is 94 and soft, the tongue warm, of a lurid red colour, moist, and nearly clean; the skin is now nearly of a natural temperature, but not so warm as last night; the abdomen is doughy, inelastic, and rather full, and he complains of pain in the belly. He has not vomited, and had no stool during the night.

℞. Extract. Colocynth. Comp.
Pil. Rhei. Comp. āā gr. vi.
Olei Menthæ Sativæ. gtt. ii. to be taken in two pills at 7 A.M. and repeated at 9, and again at 11 o'clock.

At Noon.—Pulse 92, the skin warm, tongue moist, and rather more loaded; he has had three fluid stools of a yellowish grey colour; he feels sleepy and thirsty. There is a slight flush in the cheeks, and he has made urine for the first time since his admission.

Let two more pills be repeated at 3 o'clock.
Allowed some hot tea and bread.

At 7 P.M.—Pulse 96 and soft; he had two free, fluid stools, of natural colour; he made urine again when at stool.

℞. Tinct. Camphoræ Comp. ʒ ii.
Aquæ Tepidæ ℥ iss.
Sacchari ℈ ss.—misce, to be taken at 8 o'clock.

Feb. 23*d.*—He had three fluid stools in the course of the night, of natural colour; pulse 88, soft, and free; tongue moist, nearly clean, and still retaining some degree of the lurid red colour before reported. The belly is soft, flat, and elastic; voice strong, and countenance cheerful; he is thirsty, but the appearances of Cholera have subsided. The feet are very sore from the strong mustard plasters.

After this date he required only mild purgatives, and regulated diet. On the 28th February he joined his ship, as she was about to sail.

Case XLII.—David Murray, Æt. 21, H.M. 26th Foot, a stout and tall man of light complexion, two years in India; came from Chinsurah on business, and walked all day in the sun, in Calcutta. Was seized at a quarter before 9 o'clock, P.M. 24th Nov. 1830, with violent cramps in the extremities, and so much pain in the fingers and toes, that he roared aloud with agony. A serjeant of his regiment put him into a palankeen and brought him directly to Hospital, where he arrived just after 9 P.M. suffering the utmost pain from the spasms; but his circulation was free and surface warm: he had neither vomited nor been purged. He was immediately bled to lb. iss. and ordered

Calomel ℈ i.
Extract. Colocynth. Comp. ℈ ss. in pills.

The spasms decreased while the blood was flowing, and ceased altogether within ten minutes after the arm was bound up. As the blood cooled, a moderate quantity of serum separated; and the surface of the cruor was rather more florid than usual with venous blood.

Nov. 25th.—He had one stool during the night, and feels well, but weak. Diet—tea, bread, and sago.

℞. Extract. Colocynth. Comp. ℈ ss.
Pil. Hydrarg. gr. v. in pills.

These pills purged him freely.

He was well enough to proceed in a boat to his regiment at Chinsurah, on the 26th November.

At the time this man was attacked, we had many very bad cases of Cholera in the General Hospital; and the men of his regiment at Chinsurah, about 18 miles distant, were suffering from a severe description of Spasmodic Cholera. Therefore I am inclined to think that if this patient had not been promptly bled, he would have had vomiting, purging, and other bad symptoms in a short time.

In many of the foregoing cases, there was coldness, sinking of vital power, and failure of the pulse; coeval with the earliest symptoms of the disease; and under circumstances in which blood-letting was not considered justifiable. We find that these patients derived benefit from opium and small quantities of stimulants: their most distressing sensations of debility, and the lowness of the pulse, were often relieved by hot sago and wine. In many instances an opiate given early; and a dose of castor oil a few hours afterwards; seem all the treatment that is requisite.

In other patients, a slight and transient feverish affection, was followed by collapse of the most formidable description; in which it was necessary to give a small quantity of opium and stimulants, before it was safe to employ purgatives and apply leeches. The patients who were treated early, in the low form of the disease; had in general more prompt recoveries, and were less liable to relapses, or to febrile affections, on returning to their usual food; than those who had febrile and inflammatory symptoms from the commencement.

On perusing the accounts we receive from home, I observe that the low form of Cholera, with early collapse, has occurred in some parts of England. Should the disease prevail extensively in Great Britain, I think it probable that cases will occasionally be met with, which commence as diarrhœa, catarrh, or slight fever; and after a few days evince a tendency to Cholera.

Cholera in Children.

European children under two years of age, do not very often suffer from Cholera; but among those who are attacked by the disease at that early period of life, a large proportion die: which I ascribe as much to the early treatment employed, as to the malignity of the disease, for, when called to see children suffering from this complaint, I have usually found that Cholera had existed for several hours before the relatives were alarmed by suspicion of the real nature of the disease; and then such powerful doses of laudanum were given, that the child has been found in a state of stupor; the coldness of extremities remaining, and the fatal event quickly followed. In children under two years of age, the disease, if left to the course of nature, usually soon sinks into the stage of collapse, with mortal coldness; and a distinct reaction rarely takes place: some morbid heat of head and chest usually occur just before death, but too transient to afford room for hopes of a favorable termination. Spasms are not a general attendant on the complaint in these young subjects, who are quickly oppressed by the venous congestion. After the contents of the stomach are thrown up, violent efforts to vomit usually cease; occasional nausea, and slight ineffectual retching occurring now and then; but unless the patient be indulged in much drink, nothing is vomited, though the watery purging continues, with gradual sinking of the pulse, and increasing coldness.

When Cholera in young children supervenes on Diarrhœa or Dysentery of several days' duration, the disease is almost inevitably fatal.

When Cholera attacks children under two years of age, the first symptoms of the disease are generally attended with extreme prostration, and cold perspirations. In such cases, four drops of *Cholera Tincture**, mixed with a little sugar in a tea-spoonful of water, will very often completely arrest the disease.

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* The *Cholera Tincture* is composed of
Tinct. Opii
Spirit. Æther. Sulphuric. āā ʒ ss.
Ol. Cinnamon. gtt. xv.—misce.

If the coldness and profuse watery evacuations from the bowels should continue, the dose may be repeated in an hour: after which, if farther stimuli should be requisite, we must make use of liquor ammoniæ, with infusion of ginger, or of capsicum; and apply mustard plasters to the pit of the stomach, spine, and feet. Should these means fortunately resuscitate the patient, much care will be requisite to prevent a return of the symptoms: mild aperients must be used, and great caution in diet observed for some days.

In the treatment of young subjects, when they are seen in the febrile stage of the disease; I have usually given to patients between two and four years of age, four grains of calomel: and if the evacuations have been profuse, I add fifteen drops of tinctura camphoræ comp. in a tea-spoonful of hot water; and repeat the dose in an hour if the symptoms continue. Should these means not check the disease, a third dose of calomel is given in an hour more, with six drops of the Cholera Tincture. And if the disease still be not arrested, the calomel is persisted in every hour; and the Cholera Tincture is given with every second dose. As soon as the stomach is tranquillized, and will retain food, let a tea-spoonful of brandy, or a desert-spoonful of sherry wine, be mixed with a coffee-cupful of thin arrow-root; a table-spoonful of this may be given once every half-hour, until the coldness of surface subsides; after which it is necessary to give a dose of rhubarb with two grains of calomel every eight hours, and a dose of castor oil in the intervals between the doses of rhubarb; so that a mild purgative shall be taken every four hours during the day, until a moderate purgative effect is produced; smaller doses, at more distant intervals, being requisite for some days afterwards, till the secretions are restored to a natural state. There is usually some obscure pyrexia, with much languor for several days, in European children who survive an attack of Cholera; and therefore the diet should be regulated so as to support strength, without exciting fever. Where the Cholera symptoms in children are less severe and more protracted, while the coldness, and low form of the disease remain, there is usually great thirst and anxiety. In this case, large draughts of cold water have decidedly caused a return of the vomiting, and hurried on the stage of collapse. The least injurious drink, is an infusion of mint, with a moderate proportion of cardamoms, or a weak infusion of ginger, or pepper in water, drank in small quantities, and cold.

During an attack of Cholera, children should be wrapped in warm flannel, and encouraged to be quiet in the recumbent posture. In patients between six and eight years of age, the above doses of medicine are to be increased one-half; and may be doubled for those more than eight years old.

CHOLERA IN ASIATICS.

WHEN Cholera attacks robust Asiatics, who are living in affluence, they very seldom have that form of the disease which is at the commencement combined with pyrexia and inflammation: and that description of the disease which usually affects the poorer natives of Bengal, is still more rarely attended with febrile or inflammatory symptoms; they commonly suffer from the low form of Cholera with sudden coldness and early collapse. Visceral disorders are seldom found to occur as its sequelæ in natives; though I have several times seen a sub-acute description of Dysentery; and more frequently, dyspeptic symptoms and emaciation, occurring in native patients who had previously suffered an attack of that disease.

The Cholera happening to natives of this country, marked by early coldness and collapse, and occasionally attended with severe spasms, is usually a more rapid and more fatal disease than we find it in Europeans: consequently we do not often see Asiatics in a state requiring V. S., or at that stage of the disease, when we might hope by bleeding to relieve the system from increasing congestion. Very few natives of this country recover from Cholera, if left without remedies; whereas, if promptly treated, the majority of ordinary cases are cured. A tea-spoonful of laudanum with a spoonful of brandy, or a tea-spoonful of laudanum with as much spirit of sal volatile, in a wine-glass of water, if given at the first moment of attack, very generally arrests the disease instantly. A gentleman who had a numerous retinue of servants, used to keep a vial of laudanum, and another of spirits of hartshorn, on his dressing table, in charge of a sirdar bearer, who being always present in the house, had orders to administer a teaspoonful out of each vial, mixed with a spoonful of water, to any native that might be attacked with Cholera. Under this mode of treatment, no man died for many years. Others have been nearly as fortunate in checking the early stage of Cholera, by keeping a bottle of Tincture of Rhubarb in readiness, and giving a table-spoonful to any native immediately he was attacked with Cholera. If stimuli are requisite after the second dose of Laudanum, Liquor Ammoniæ is the best. I have found it convenient to keep the *Cholera Tincture*, mentioned at page 226, always in readiness: a desert-spoonful, given in a wine-glass of water to an adult, I think generally answers better than any of the above remedies, if given equally early in the disease. By whichever of these modes the first approach of an attack of Cholera in a native is arrested, it is usually proper to order a cup of hot sago, within an hour after the medicine; and if the patient be a weak person, and any degree of coldness remain, a spoonful of brandy ought to be added to the sago. If the first dose of either of the above medicines be rejected by the stomach, or fail to have the desired effect, it should be repeated in one hour; after which, if the symptoms continue, six grains of blue pill, with one grain of opium, and two of asafœtida in a pill, are to be given an hour after the second dose above ordered, and repeated every second hour while vomiting and purging continue. More sago may be given after a few hours; and provided the disease be arrested, we should allow the patient to remain quiet wrapped in a blanket for eight or ten hours; and then give him a dose of castor oil. In a few cases, where febrile symptoms remain after a Cholera attack in natives, leeches are requisite to remove local congestions and inflammations; and four grains of blue pill with eight grains of compound extract of colocynth, may be given daily in the morning; followed in six hours by an ounce of castor oil, if the patient be not purged by the pills. In native Cholera patients, having symptoms of Spleen Disease, mercurial preparations should be omitted. Asafœtida combined with opium often has a remarkably good effect on natives who are slowly becoming cold, with Cholera symptoms; the oriental mode of administering it, is to make a soft pill of two grains of opium with as much asafœtida, which is chewed and swallowed slowly with the saliva. I have ordered this prescription, with the addition of six grains of blue pill, and two drops of Ol. Menth. Pip. directing the medicine to be chewed and swallowed. It has been the means of curing many natives who had become cold, and had a rapid feeble pulse that was hardly perceptible. The warmth was gradually and slowly restored, and circulation recovered its natural strength, after the use of this medicine: nothing being required but a few moderate doses of castor oil; and attention to regulate the food used by the patient for some days.

There is such variety in the symptoms and course of Cholera in different patients, that I am induced to state two cases of Europeans, and one of an Asiatic, in which the secretions were carefully analysed; so that there may be no doubt of the exact nature and stage of the disease, corresponding with the fluids examined: and I may observe, that the general account of Chemical Analysis stated at page 23 to 34 is the result of experiments made in every stage of the disease. The conclusions deducible from all my investigations relative to this part of the subject, are adverse to the opinions of those authors who say that the sub-albid stools, resembling barley-water, are pure serum, as some state; or serous evacuations, as others have asserted. This, like every truth connected with the pathology of acute diseases, may be deemed important; for it will influence our opinions regarding the condition of a patient; and our practice must of course be more or less modified by such opinions. Moreover, attention to the nature of those secretions may be of use in fixing the identity of the disease now treated of, and establishing its affinity with the Cholera of remote countries; or with the varieties of disease which may hereafter appear in India. With this view, I have been willing to state particularly the nature of a few of the cases from which the fluids examined have been taken.

Case XLIII.—Pierre Vinceau, Æt.

19, a sailor of the French ship *Cygne*, sent to Hospital in the most alarming state of disease: no written account of his case was received with him. Admitted 4th December, 1830, at 10 A.M. A slight made lad, of dark complexion, six weeks arrived in Bengal; states that he was taken ill at 5 P.M. yesterday, with a sensation of weakness, and pain at the heart: vomiting and purging took place soon after, and he had cramps in his legs during the night. He has been very often to stool, but only vomited four times in the night, the last time at 10 P.M. Has been thirsty, and drank much water. His voice is good and strong, and there is very little anxiety at present. Pulse 120 and feeble; extremities cool and perspiring, but not cold; tongue cool, moist, and nearly clean; the eyes are not sunk; he is tranquil, and not now calling for drink. Had one grey fluid stool, in quantity about 10 oz. soon after admission.

When the bulb of the thermometer was placed under his tongue, the mercury stood at 91, and temperature of the extremities was ascertained to be 82. The atmosphere being at this time at 76 degrees of Fahrenheit.

Spirit of turpentine was rubbed to the extremities constantly. He was made to swallow half a drachm of Cajeputi Oil, in half an ounce of cinnamon-water; and the dose was repeated in half an hour. No effect being produced by the two first doses, one drachm of the oil was given at 11 o'clock, and repeated every hour till 3, making in all, six drachms of the Cajeputi Oil.

Half past 3 *o'clock*.—The patient has been frequently visited, during the interval since 10 o'clock: the Cajeputi Oil has had no effect; he appears rather worse, and is very slowly sinking into a state of torpor: there has been no vomiting, but he has had three more conjee stools, each in quantity about 8 oz. Hot sago 3 oz. brandy 1 oz. directed to be taken just after the last dose of Cajeputi Oil.

℞. Calomel. ℈ i.—Opii gr. ½.
Extract. Colocynth. Comp.—Asafœtidæ āā gr. v.
Ol. Menth. Pip. gtt. ii. to be taken in three pills; and repeated every hour.
℞. Spirit. Ammoniæ Aromat.
Tinct. Cardamom. Comp. āā ʒ i.
Aq. Cinnamon. ℥ iss. misce,—to be drank after each dose of pills.

Six o'clock.—He continues slowly sinking. The same pills and draft as ordered at half past 3 o'clock, are to be given every hour till six doses are taken. Hot sago and 1½ oz. of brandy at half past 9 o'clock. Castor Oil ʒ i. at 10.

Dec. 5th.—No stools or vomiting during the night; the extremities and tongue are cold, but the forehead, neck, and chest, are hot; the face is livid; pulse at the wrist is barely perceptible: he is restless, and asking for drink; respiration hurried and feeble; voice weak and pectoral. Large sinapisms were applied to the belly, also to both feet. Ol. Ricini ℥i. was given every hour, and fifteen minutes after the oil, he was ordered an Enema of Ammoniæ Carb. ʒi. in three pints of hot water, to be given with the pump. He derived no benefit from the remedies, and died at 11 o'clock A.M.

Dissection at 4 P.M.; five hours after death. Much venous congestion of the brain. Both lungs universally adherent, but not bearing marks of the adhesions being recent; there were a few small dark-grey tubercles in the lungs. All the cavities of the heart were gorged with coagulated blood; the anterior portions of the coagula white. The liver was rather large, its surface mottled; its structure soft, and bleeding freely when cut into.

The omentum and mesentery were in a state of high morbid vascularity; also that part of the peritoneum placed across the bodies of the vertebræ: glands of mesentery and mesocolon enlarged.

Peritoneal surface of stomach, and intestines, rather more coloured with pink, than in the healthy state.

The mucous membrane of the stomach was exceedingly vascular; the coats of the small intestines slightly thickened: there was much pale brown fluid in the stomach; and some fluid in the upper third of the small intestines, which was tinged deeply with orange-coloured bile; the lower portion of the small intestines contained a pale-grey fluid. The large intestines contained much dark-brown watery fluid. No other morbid appearance noticed.

It may be sufficient to state the result of the analysis of the third *conjee-stool* voided by this man after his admission into the Hospital. That fluid was left to stand for two hours, and a quantity of grey paste-like mucus had then subsided; the following was the result of examination.

1. The mucus which had subsided to the bottom of the test tubes was found partially soluble in cold water, affording an opalescent turbid fluid.

2. Another portion of the sediment, measuring ʒ ss. and of the consistence of thick mucilage; was entirely soluble in a mixture of ʒ x. of Liquor Ammoniæ, with the same quantity of distilled water.

3. Another portion of the same sort of mucus, measuring ʒ ii. was heated in a small evaporating dish over a spirit lamp; and during the process an odour of putrid flesh was evolved. It dried into a thin film, which became charred and black, without burning in a flame.

The watery fluid was next examined.

4. It had a slight effect in reddening litmus paper; the colour of which was restored by dipping the the paper into a mixture of four drops of Liquor Ammoniæ, and half an ounce of water.

5. Heated slowly over sand, to 200 degrees of Fahrenheit, it did not coagulate. When the heat was raised to the boiling point, a few small grey flocculi formed.

6. The addition of a solution of oxymuriate of mercury, produced a slight turbid appearance, and at the end of 12 hours, a minute precipitate had formed, which was estimated at $\frac{1}{32}$ of the quantity of fluid submitted to this experiment: the fluid at the upper part of the tube having a slight opalescent appearance.

7. Solution of subacetate of lead, instantly caused a dense curdled appearance, which quickly pervaded the whole tube, and in a short time began to subside; at the end of 12 hours it had settled down, so as to occupy $\frac{1}{8}$ the space of the tube that had contained the fluid examined.

8. The addition of alcohol to another portion of the fluid, produced no effect.

9. The addition of infusion of galls to another portion of the fluid caused a slight turbidness, and after some time a very few minute flocculi subsided.

The examination of the fourth conjee-stool voided by this patient afforded similar results.

CASE XLIV. — Torrens, Æt. 29, a muscular man, of middle size and light complexion; a sailor of the ship *Mount Vernon;* arrived from sea about the middle of October, 1831; and after remaining a week on board, he landed in the afternoon of the 21st, and drank some spirits in the bazar, but says he was not drunk. Late in the evening he was wet by a shower of rain; and failing to get on board, he slept in a shed near the bank of the river. About midnight he was seized with cramps, followed by vomiting and purging; at 9 o'clock A.M. he succeeded in getting on board, and the Captain gave him 60 drops of laudanum in a glass of brandy; after which, the vomiting and purging ceased: but he remained so much distressed by anxiety and feeling of debility, that it was considered best to send him to the Hospital, where he arrived at 1 P.M. 22d Oct. The stage of collapse was then commencing: his face was pale; he was covered with a profuse perspiration, and suffering from much anxiety; the tongue white and clammy; pulse tolerably free; the belly tense and tumid. A vein was opened, and when ℥ x. of blood had flowed, the pulse sunk so rapidly that it was not deemed safe to take more. Twenty grains of calomel with two grains of opium were given. Within an hour the pulse rose, and the orifice of the vein being opened, six ounces more blood were allowed to flow, by which the pulse was rapidly and permanently sunk. A large sinapism was now applied over his belly, and spirit of turpentine diligently rubbed to the extremities. The ten ounces of blood first drawn, coagulated; and a small quantity of bloody serum separated, which on exposure to heat of 160° formed a firm coagulum. The blood last drawn coagulated, but no serum was separated: the cruor of the blood in both cups was remarkably dark-coloured.

Calomel, with colocynth, asafœtidæ, and oil of cinnamon, were repeatedly administered, and stimulants used: and he took a dose of spirit of turpentine and castor oil, each one ounce; but no medicine had any effect; he gradually sunk into a state of torpor, pulse at the wrist ceased, and the fingers became shrivelled. He died at 3 A.M. on the 23d October, fourteen hours after admission into Hospital: during which period he had four scanty fluid stools of a brown colour, and vomited several times.

Dissection.—Twelve hours after death.

Muscles rigid; lungs gorged with blood, especially at the depending parts; and there was a small quantity of mucus in the trachea and bronchial tubes. There were a few small ecchymosed specks on the right side of the heart. Some morbid vascularity of the omentum and mesentery was observed, and the glands of the mesentery and mesocolon were enlarged. The stomach was pale externally, and its coats much thickened; its mucous membrane corrugated, and covered with a large quantity of thick tenacious mucus: when that was scraped off, several vascular patches of deep-red colour were seen. The pills, in solution, and some turpentine with castor oil, which had been taken several hours before death, remained in the stomach.

The coats of the small intestines were much thickened; at no part could they be deemed paler than natural, but several portions for the extent of a foot in length, had the minute vessels injected with red blood, in a very extreme degree. The small intestines contained much watery fluid; in some parts this was tinged with yellowish bile, in other parts of a pale-grey colour, mixed with many large masses of white mucus. The coats of the colon presented no morbid appearance, and this intestine contained much fluid of dark-brown colour. The liver was large, and its texture soft; the colour was natural, with the exception of a slight mottled appearance, from a few small pale spots on the surface of the left lobe. Gall-bladder, adherent to the adjacent parts; it was much enlarged, round, and distended with very fluid bile, of a natural colour. There was a great degree of venous congestion of blood in the brain, and the large veins along the spine were gorged with black-coloured blood. Some serous effusion was observed between the tunica arachnoidea and pia mater: there were ʒ iiss.

of serum in each lateral ventricle; and ℥ iss. below the tentorium.

A portion of the fluid vomited, (and on the top of which some castor oil floated,) was filtered; it was transparent, with a slight tinge of straw-colour: when examined, the following appearances were observed:

1. Litmus paper was quickly changed to a pale-red colour.

2. Solution of oxymuriate of mercury produced a slight turbid white appearance, but no precipitate formed.

3. Another portion of this fluid, exposed to heat, which was gradually increased up to 212°, assumed a slight smoky colour; and at the end of twelve hours, a few minute grey flocculi were observed floating in the fluid.

4. Solution of subacetate of lead, dropped into a test-tube containing some of the fluid, quickly produced a dense curdled appearance, which at first seemed to consist of all the fluid; but a precipitate soon subsided, and in twelve hours occupied a quarter of the tube which had been filled with the fluid tested. This precipitate was a dense pale-yellow mass, not easily mixed with the fluid on shaking the

tube. The liquid which floated above the precipitate was nearly transparent, with a slight bluish tinge; a few small white flocculi adhered to the inside of the test-tube.

5. On addition of the infusion of galls, the fluid became turbid, and a pale lead-coloured precipitate formed, which subsided in twelve hours, so as to occupy $\frac{1}{24}$ of the space in the tube, which had been filled with the fluid tested. The precipitate was light, and easily diffused through the fluid by shaking the tube.

The most fluid of the stools, voided while he was in Hospital, was filtered through paper; and then it had the colour of weak coffee, of a peculiar fœtid odour, not like fæces. The filtered fluid was diluted with equal quantity of distilled water, for the purpose of decreasing the colour, that the effects of re-agents might be better observed: and when tried with various tests, the following effects were observed:

6. Litmus paper was slowly and slightly changed to a reddish colour.

7. A portion of the diluted fluid, exposed to heat gradually raised to 212°, became in a slight degree more transparent; it did not coagulate, but a few

small black flocculi were seen floating in the fluid when it was cold.

8. When solution of oxymuriate of mercury was added to another portion of the diluted fluid, a dark chocolate-coloured precipitate slowly formed, and in twelve hours subsided, so as to occupy $\frac{1}{20}$ of the space of the tube that had been filled with the fluid examined. The supernatant liquor was of a pale tea-colour. The precipitate was dense, and not easily raised or diffused through the fluid by slight agitation.

9. The addition of a solution of subacetate of lead to another portion produced an immediate dense curdled precipitate, that quickly fell to the bottom of the tube; and at the end of twelve hours it occupied $\frac{1}{5}$th of the space in the tube that had been filled with the fluid: the supernatant liquor was nearly transparent; a few pale-grey flocculi adhered to the sides of the tube.

10. In another portion of the diluted fluid, when treated with infusion of galls; a precipitate slowly formed, of a pale-brown colour, which in twelve hours was found to occupy $\frac{1}{5}$th of the space of the tube that had been filled with the fluid examined; it appeared like a very light mucilage, and was easily again diffused through the fluid, on slightly shaking the tube.

Case XLV. — A Mahommedan Burkandauze, named Shaik Sonawalla, aged 35 years, employed at the Calcutta Great Jail; was taken ill with Cholera about 1 A.M. on the 1st December, 1831. He made no application for medical aid, and was watched in the Guard-room of the Jail, by his comrades, who kept him covered with blankets, and champooed the limbs when the cramps were severe. My advice was not requested until 4 P.M., when the friends thought he was about to die: they asserted that he had been vomiting very often; but not purged much until mid-day; at which time cramps in the legs came on, and the purging and coldness were so much augmented as to excite alarm. I found him cold, his countenance sunk and ghastly; eyes blood-shot; the fingers slightly shrivelled; voice weak; pulse 138 and very feeble; tongue moist, and clean; he was anxious, and the respiration hurried; he eagerly requested water to drink.

His friends asserted, that he had not swallowed any thing since noon, and had taken only a few spoonsful of water during the early part of the day. A large panful of clear watery fluid had been voided by stool: it was hardly more coloured than pure water; some uncooked rice, very little swollen, was observed at the bottom of this pan. The patient, on being particularly questioned, acknowledged that he had eaten raw rice at a very late hour on the previous evening. The fluid vomited was slimy, and not quite so clear as the stools.

He was made to take ʒ i. of Laudanum, with as much Spirit. Æther. Sulphuric. and four drops of Oil of Cinnamon, in ℥ iss. of water; which quickly alleviated all the more distressing symptoms; and he was neither vomited nor purged afterwards.

At 6 P.M.—He was free from cramps:

the pulse 118; there was slight return of warmth of surface; tongue clean and moist: he complained much of thirst. Some thin hot sago with ℥ iiss. of brandy was now given, after which he slept.

Dec. 2*d.*—Has had neither vomiting or purging, but is anxious, weak, and thirsty; eyes blood-shot; extremities warm; pulse 92, soft, and weak; tongue nearly clean and dry, with little white appearance in centre. He was ordered ℥ is. of castor oil with cinnamon water, which purged him four times in the course of the day, and he was persuaded to take a small quantity of sago, without brandy. The stools were copious and of dark-grey colour. He now earnestly entreated that his friends should be allowed to take him home to his village, which was near. This request was complied with, and he remained at home nearly a month; but took no medicines except two doses of castor oil. He recovered, and is now employed on the Jail duties.

The slimy fluid vomited, was strained through muslin; and then had a very slight turbid appearance.

1. It quickly reddened litmus paper.

2. A portion was gradually heated to 212 degrees of Fahrenheit, but no part of it coagulated.

3. Another portion tested with solution of oxymuriate of mercury; indicated no change, except a very minute milky cloud, which was dissipated on shaking the test tube.

4. Transparent solution of subacetate of lead, dropped into another portion of the fluid, caused an immediate white curdled appearance; which slowly subsided to the bottom of the tube, leaving the supernatant liquor transparent, with a slight bluish tinge.

The clear watery fluid of the stools was poured off from the small quantity of rice, and examined without straining.

5. Litmus paper was changed to a red colour when wet with this fluid.

6. A portion of the fluid was exposed to heat, gradually increased to 212^0; it neither coagulated, nor did any precipitate form.

7. Another portion of the fluid was tested with solution of oxymuriate of mercury; which slowly produced a slight turbid appearance, and in twelve hours a minute mucilaginous deposit took place at the bottom of the test tube: the fluid above being opalescent.

8. Solution of subacetate of lead, dropped into another portion of fluid, in a tube; produced an immediate curdled appearance, which soon subsided in a dense white mass, and at the end of twelve hours was found to occupy $\frac{1}{10}$ of the tube that had contained the fluid tested: the liquid above was quite clear.

9. Another portion of the fluid was tried with pure alcohol; which produced no turbidness, nor precipitate.

10. Infusion of galls was added to another portion of the fluid in a tube; which slowly produced a slight mucilaginous precipitate, of a pale-fawn colour, which was easily diffused through the liquid, when the tube was shaken.

To avoid the probability of erroneous

conclusions, I have tried similar tests on the various kinds of food and drink allowed to Cholera patients : so as not to mistake the effects of the tests on any of those articles, for their effects on the secretions of the stomach and intestines.

The Cholera stools, and the matter vomited, not coagulating on the application of heat, or on the addition of solution of oxymuriate of mercury ; and containing no uncombined soda; shew us that they do not consist of the serum of the blood, and do not contain any appreciable quantity of albumen : while the indications, when we add the solution of subacetate of lead, give sufficient reason to conclude that the sub-albid evacuations in Cholera, consist chiefly of mucus, and a peculiar morbid secretion. I am not aware of the grounds on which Dr. Bostock has stated that animal mucus is merely a modification of albumen*; though I am ready to place the highest confidence in his opinions.

FACTS RELATIVE TO CONTAGION IN CHOLERA.

It is an object of much importance to ascertain, if possible, whether Cholera be a contagious disease, and liable to be communicated generally to those in health, by means of a virus generated about the persons of the sick: and conveyed either indirectly, by means of clothes or goods; or received directly, by personal contact or near approach to patients: whereby the disease is produced, independent of other exciting causes. If it should appear, that Cholera is *generally* propagated by means of some noxious emanations from the persons of the sick; the strictest quarantine regulations would of course be advisable. On the contrary, should we observe that the disease is neither generally, nor even frequently, found to affect those who are most exposed to personal communication with the sick, under such circumstances, that if contagion existed, we might reasonably expect it would be present in its most concentrated and active forms: we would then doubtless abandon all idea of retarding the progress of Cholera, by interdicting direct intercourse with the sick, or with those who may be exposed to any emanations from the bodies of persons suffering under that disease.

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* "Animal mucus appears to be nearly related to albumen, and indeed the constituent upon which its characteristic properties principally depends, would seem to be a mere modification of this substance."—*Bostock's Physiology*, vol 1. p. 48.

I will now proceed to state such facts as appear conclusive with respect to the Cholera of India; shewing the results of unrestricted communication with the sick: and if the disease be neither generally, nor frequently, received, after the most extreme exposure; few persons will deem the danger great, from slight and transient intercourse with the sick. If the disease ever possess contagious properties, assuredly there could be no difficulty in pointing out the particular instances of contagion, at the time that they occur.

The persons most exposed to contract Cholera in the General Hospital at Calcutta, (if the disease were contagious,) are those having charge of the bedding and clothing, and those employed in personal attendance on the patients. The man who has charge of the Hospital clothing, and his assistant, both attend in the wards every morning, changing the bedding of one ward each day, on ordinary occasions. But when Cholera exists, these people are obliged, in the majority of cases, to change some of the bedding of the patients having that disease daily, or oftener when soiled; for which purpose they come to the bedside, taking away with them the dirty-bedding, which is given to the head-washerman. The clothes-keeper, Shaik Selim, at present employed at this Hospital, has been on that duty for two and a half years; his predecessor Dhowall filled the same office for twenty-three years, and died at his own house, of old age and debility; having been pensioned for long service. The head washerman Gawhée, at present employed here, has been on this duty about one year and a half; his predecessor Hassye, held that office for two years, and died of chronic disease of the bladder, after an illness of near four months. Before this man, Beechuck was washerman for twenty-one years; he died of chronic induration of the liver, and pulmonary disease, Not one of the subordinate washermen or people employed about the clothing and bedding stores has ever had Cholera.

The native dressers have daily the most unreserved communication with the sick, changing the applications over leech-bites, and the bandages to the arms of such as are bled; dressing blisters, and applying sinapisms: not one of these men has ever suffered from the disease. Buctourie, the head native dresser, who instructs the subordinates and attends with them alternately, while at their duty, has been constantly employed at the Hospital for twenty-six years. He is a clever man, of good character, and asserts that he has never known one of the Hospital servants to be attacked with the disease.

The sweepers who clean and change the close-stools, as well as the pans in which the matter vomited is received; and who wash those patients who are helpless; have never been known to suffer from Cholera. It may be supposed that the occupations of the sweepers, are usually such as might be expected to blunt their susceptibility to disease, or to the effects of any ordinary exposure; but this will not be urged respecting the Hindoo Coolies; who are employed in ordinary attendance on the sick, and are obliged to be much in contact with all bad cases of Cholera, to keep the blankets from being thrown off, and the men from falling out of bed, when in the worst stages of the disease, and suffering much from jactitation and restlessness. These coolies are also employed to rub and champoo the extremities of the Cholera patients; and often cannot avoid inhaling the breath, as well as the exhalations from the bodies of patients, in the most deplorable stages of the disease. Not one of these men has ever suffered an attack of Cholera. The young students, who are under a course of medical instruction, at the H. C. School for Native Doctors; are usually in attendance and assisting at the Hospital when Cholera is prevailing in a severe form, and when great numbers of patients are admitted with that disease, In March and April, 1827, when the Hospital was unusually crowded with Cholera cases; and all the attendants much distressed and exhausted by the severe duty: a number of the young students from the school, were brought to the Hospital, and placed in attendance over the worst cases; being relieved regularly day and night. These young Asiatics performed their duties with great diligence, assiduity, and humanity, for many days and nights; and none of them suffered by this constant exposure to whatever may be contagious in the emanations from Cholera patients; as well as frequent contact of their persons. I publish these statements, after having made the most careful observations on this subject, when the disease has been prevailing, during my residence at the Hospital: and after the most diligent inquiry relative to the same points during the last fourteen years. A remarkable instance of exposure, with impunity, to any morbific causes arising from the person, during Cholera, is recorded at page 204 of this work.

By Mr. Henderson's account of the disease which appeared on board the H. C. ship *Berwickshire,* in Bombay Harbour, in June 1830, it appears that ninety-four men were taken ill of Cholera within a few days; of whom thirty-eight died. A large proportion of the sick was landed, and treated at the Bombay European Hospital, and sixteen of the deaths occurred in that Hospital, where there were at the time more than one hundred patients and attendants, not one of whom contracted the disease.

The History of Cholera in India presents us with a vast number of instances, where either a body of healthy troops has joined and encamped along with those among whom the Cholera was existing in the most violent and fatal form; or where a detachment in which the disease was raging, has joined a healthy encampment: and the disease has not been, in either case, communicated to those in a healthy state. A body of Holkar's Reformed Cavalry, 500 strong, were posted at Mahidpore, adjoining to the camp of above 2,000 Bengal troops and followers, among whom the epidemic was prevailing; and the Cavalry did not suffer from the disease, although a Cholera patient from the Bengal division was brought to their camp, and went through every stage of the disease among them. In like manner, Casement's Regiment of Irregular Horse joined the Hansi division of the Army, and remained with that division without contracting the disease, at the time when the Epidemic Cholera was at its height. On the 11th May, 1818, a company of Bengal troops, ninety in number, encamped at an unhealthy spot on the bank of a small lake, sheltered by a few trees, and surrounded by low woody hills. The detachment arrived at this place all in perfect health; Cholera commenced at midnight, and before sunrise next morning, twenty men were ill of that disease: they were removed to the Saugor camp, in carts and doolies, in the course of the day; but before arrival there, five men had died, and two were moribund. By the end of the week, every man of this detachment had gone to Hospital with Cholera, or with a purging of some sort, resembling modifications of that disease: so that there could be no doubt of the malignity of the malady from which they were suffering. The men of this detachment had unrestricted intercourse with the troops in camp: not one individual of whom was attacked with Cholera. For these facts, I refer to the Bengal Report on Cholera, p. 133, 134, and 137. More than a hundred such instances may easily be collected, by any one who will take the trouble to make critical inquiries respecting the history of Cholera for the last fifteen years. The facts above cited are sufficient to prove that the Cholera in India, when existing in its most aggravated form, is not a contagious disease; and that there is no virus generated in or about the sick, by means of which the disease may be communicated to persons in health. The facts which prevent our acknowledging that the Cholera of Bengal is contagious, are numerous, well authenticated, and the details are precise.

It appears, that a body of troops joining a camp at an unhealthy station, after long marches, is very liable to suffer from Cholera; but if a camp in which Cholera exists, should move to a healthy station, and still numbers of their men continue to fall ill of the disease, in consequence of their past exposure; troops joining them after their removal to the healthy camp, do not suffer from Cholera. It has often happened, that this disease has raged among troops encamped on the low banks of a river: without any evidence of Cholera having travelled to them, or having been propagated from them to others at a short distance, who communicated freely with those suffering from the disease. Epidemic invasions of Cholera, arrive at their acmé so quickly, and then subside, as stated at page 11, continuing in their severest form so short a time, that the effects of change of place can hardly be duly estimated. We know that a body of troops having suffered severely from Cholera, and remaining at the same station during the disease, and after its subsidence; has in many instances been unhealthy for five or six months afterwards: suffering from fevers, and dysentery, with occasional cases of Cholera. Places where the residents are usually very subject to fever, have of late years been frequently visited by Cholera. These and similar facts afford the grounds on which we should be disposed to ascribe the Epidemic Cholera to some morbid influence connected with locality, sudden changes of temperature, and humidity; more especially when these morbific causes have to act on persons debilitated by disease, or fatigue and privations. Troops having marched through an unhealthy district, and who have been subject to much exposure, fatigue, and privations, are very liable to the disease; both on the march, and when they halt; whether they join a healthy or a sickly camp. Although we have positive proof, that the worst forms of Cholera have not been communicable by means of any virus arising from the persons of the sick, in India: we cannot ascertain why the causes usually exciting Cholera, do not invariably produce the same effect; and why numbers of persons are at times exposed to all those circumstances, which at other times excite the disease, and still Cholera does not appear among them. However, as already observed, the same immunity frequently happens when persons are exposed to the ordinary exciting causes of Fevers, and many other diseases; concerning the proximate cause, and essential nature of which, we can hardly boast of knowing more than we do of Cholera.

Contagious diseses differ in many respects from Cholera: they go through a regular course, and persons who are exposed to the virus by which they are produced, only shew signs of disease at a certain period after exposure; and that interval in the majority of cases is uniform. We find nothing of the sort in Cholera, which in some cases has attacked men the day after landing from ship, and second day after arrival from sea, as reported by Mr. Scott, in the instance of a portion of the 41st Regiment on arrival at Madras roads. If we examine critically the circumstances connected with any attack of Epidemic Cholera at a station, we find reason to conclude, that the disease is dependent on some morbific influence connected with the locality: for it often happens, that a short time before the appearance of numerous severe cases of Cholera in a town; a disordered state of the digestive organs, and tendency to diarrhœa and nausea from slight causes, have been observed among numbers of the inhabitants; after which the Epidemic Cholera bursts forth suddenly, affecting numbers of persons at the same time; and in many instances, attacking persons who have had no sort of communication with those who were suffering from the disease. Those who are sickly and predisposed, are destroyed in three or four days, and at the end of another week, the severe form of Cholera disappears. There is no progressive course, or succession of attacks in the individuals of a town, during a severe visitation of the disease; so as to warrant the belief that it is communicated by a virus received from sick persons. Diseases which are distinctly proved to be contagious, namely Variola, Rubeola, Pertussis, and some others; attack persons in good health, nearly as readily as they do the debilitated and infirm; without being influenced by abrupt atmospheric vicissitudes, in the degree to which Cholera seems to have been, on almost every occasion when the severest epidemic visitations have occurred. Nevertheless, we are obliged to acknowledge that the contagion of Fevers readily affects persons suffering from poverty and mental inquietude, exposed to much fatigue, ill fed, and insufficiently clothed: while men who are in circumstances which enable them to preserve a tranquil state of mind, and whose digestive organs and general health are unimpaired, are very often exposed to similar degrees of febrile contagion, with impunity. The extreme proclivity to Cholera, produced by debility, from whatever cause it arises, is also a very remarkable fact.

Having already stated the entire exemption from Cholera, of those persons employed in the General Hospital, and who were most exposed to unreserved and constant communication with the sick; I am desirous to mention that when Epidemic Cholera has prevailed in Calcutta, and we have had numerous admissions of that disease into General Hospital, more especially if the wards have been much crowded at the time; we have very frequently had sick and convalescents attacked in Hospital; and there has evidently been a strong tendency among the patients who have been for many days, or weeks under treatment for other diseases, to lapse into the low form of Cholera, with early accession of collapse, coldness, and cessation of the pulse.* It has generally happened that those attacked in this manner, have been in parts of the Hospital remote from Cholera patients; very often in a different building, and precluded from any direct communication with those who were brought in with Cholera. Moreover, these cases of the disease occurring in Hospital, have generally happened at times when we knew that severe and sudden attacks were frequently occurring in persons living at various and distant parts of the town and suburbs of Calcutta.

I have never known a man to be attacked by Cholera in Hospital, whose bed was next to that of a man suffering from the disease: and the only two instances where Cholera supervened on other diseases, in men already in Hospital, and in the same room with Cholera patients, were the following:

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* See pages 15 and 20.

Case XLVI.—Benjamin Fowle, was admitted into Hospital on the 15th November, 1830, labouring under Cholera in an advanced stage of collapse; he died in the course of the night. His bed was the fourth from that of the patient whose case is next to be mentioned.

Case XLVII.—James Poste, a tall man, 20 years of age, recently arrived from Europe: came to Hospital at 8 a.m. on the 14th November, 1830. He had been ill fourteen days with dysentery, and induration of the cœcum; for which he had used calomel, and his mouth had been sore for one week before he came under my care. On admission, he was suffering from pyrexia, induration of the belly, and the usual dysenteric symptoms in an aggravated degree, and he voided much blood. He was freely bled from the arm, and seemed to be improving daily, till he was seized with Cholera at 10 P.M. on the 17th November; the vomiting was frequent and violent, and he voided by stool a clear water, in which seven or eight small flat pieces of fæces were observed; they were of natural colour, and the size of a flatten pea. This man sunk rapidly, and died at 2 A.M. on the 18th November. On post-mortem examination, eleven hours after death, the subject was found not much emaciated. There was much venous congestion at the base of the lungs. Liver, gall-bladder, and biliary ducts perfectly healthy; omentum, mesentery, and mesocolon, very vascular. The stomach and small intestines were distended with gas, and externally of a pink colour; their coats very little thickened; but there was no sort of morbid vascularity of their mucous surface: there was a small quantity of thin subalbid mucus, like flour and water, in the stomach and small intestines. The cœcum was distended with gas: and there was a small abscess, surrounded with much induration, found between the cœcum and the iliacus muscle; and in the abscess a small rounded earthy mass, larger than the stone of an olive. There was no opening from the abscess into the intestine, but a small aperture communicating with the appendix vermiformis: and the natural aperture from the appendix into the intestine was closed. The whole of the colon, except the ascending portion, was contracted, and a few superficial ulcers were observed on its mucous membrane: there were several dark purple ecchymosed spots, like scorbutic blotches, on the peritoneal surface of the transverse colon; but no corresponding ulcers on the interior of the intestine. Many of the men who came from Europe, in the same ship with this patient, were suffering from a scorbutic condition, on landing. This man, in addition to Dysentery, had an abscess exterior to the cœcum ; which appears to have been excited by the stone of some fruit having got into the appendix vermiformis, where it caused inflammation, adhesion of parts, and abscess exterior to the intestine.

The only other patient attacked with Cholera, in this ward, in the course of this month, was placed in the opposite side of the room, about twenty-six feet from the place where Poste died : but he did not come into Hospital until four days after the death of the last-named man : and although I have no reason to suspect that his disease could be ascribed to any contagious influence generated by the other two patients ; I will mention the particulars of his illness.

Case XLVIII.—Samuel Cox, Æt. 22, arrived from Europe on the 10th November, 1830, and was admitted into

General Hospital on the 22d, with very severe Dysentery, attended by much pyrexia, and some enlargement of the liver. This man was twice freely bled from the arm; and had leeches applied to the belly daily till the 25th; and the other remedies usually ordered in Dysentery were employed. On the morning of the 26th, some slight appearances of Cholera were manifest; such as anxiety, languor, and exhaustion, with inclination to vomit. He had had ten stools between midnight and 6 A.M.; the evacuations a scanty watery fluid, tinged with blood.

The case was carefully watched, and medicine omitted. From 6 A.M. to 4 P.M. he had twenty stools, the same as above described: anxiety and debility were much increased. Still we were unwilling to consider it an attack of Cholera, and as the man's ailments had been so distinctly febrile and inflammatory, there was less fear of sudden collapse from waiting a few hours. From 4 to 10 P.M. he vomited very often, and had four stools, in appearance like pure water; he suffered from cramps in the right thigh and belly; the pulse was feeble; tongue cold, moist, and blanched, or bloodless, like a piece of flesh that had been steeped in water; and his countenance was expressive of that extreme anxiety and exhaustion so remarkable in Cholera. He was ordered to take two grains of opium with twenty grains of calomel in pills, and immediately after them a cup of hot sago, with ʒ iss. of brandy. He soon became warmer, and the pulse revived; the vomiting and disorder of the stomach and bowels were arrested; he slept, and the Cholera symptoms ceased. Afterwards the dysenteric affection, with bloody evacuations, became again predominant, and was only cured by a long and careful treatment.

He left Hospital quite well on the 12th January, 1831.

We have no doubt that debilitating diseases of any sort, and more particularly bowel complaints, render patients in Hospital very liable to attacks of Cholera of the worst description; but I am unacquainted with the history of any hospital, which affords proof, that the most aggravated forms of Cholera have ever proved contagious.

Mr. Hitchcock's account of the Cholera on board the H. C. ship *Abercrombie Robinson*, exhibits an excellent example of the proclivity which debility and impaired health induce to attacks of the worst and most untractable descriptions of Cholera. That ship, direct from Europe, arrived at Bombay on the 4th June, 1828, and sailed from thence for China on the morning of the 10th August: during this long detention in harbour, the greater part of the crew had suffered from the ordinary diseases of Europeans on arrival in hot climates, by which the constitutions of many of the men had become impaired.

On the morning of the 10th August, before leaving harbour, the boatswain had a violent attack of Spasmodic Cholera: and no other case of the disease appeared till the night of the 12th, when two of the crew were taken ill with the low form of Cholera, attended by early collapse, but did not report their illness till the next morning. In the course of a few days, thirty-eight men were attacked with the disease.

Of these, ten men were at the time in the sick list, and they all died; ten more were weak and in bad health, in consequence of former illness, while in Bombay harbour—of these seven died, and three recovered; the remaining eighteen were well, and at duty when attacked—of these seven died, and eleven recovered. The men who first fell ill, with the exception of the boatswain, had the low form of the disease, which commenced with collapse; those occurring at a later period suffered from the inflammatory and febrile form of Cholera. Mr. Hitchcock's narrative is the most complete account I have seen of a local epidemic attack of Cholera: it exhibits all the circumstances connected with the disease on board a ship, whose crew consisted of about 150 men.

When we observe Cholera to have appeared progressively along great roads and navigable rivers; where frequent communications by travellers, and much commercial intercourse exists; the idea of contagion is readily suggested, and it is not easy for any one to give positive proof that such idea is erroneous, except a person were on the spot, and able to examine all the circumstances connected with the origin of the disease, at the time when it was supposed to have been produced by means of contagion. When Cholera appears in a town on a much frequented road, it is always possible to ascribe its importation to the travellers last arrived. When a proclivity to the disease exists at a station, from some circumscribed endemic influence; it is evident that when travellers arrive after long journeys, during which they had been deprived of their ordinary domiciliary comforts, and subjected abruptly to change of air, water, and food: they are under circumstances in some respects resembling our recruits on arrival from Europe, who are prone to the severest forms of the disease. Thus predisposed, it is not surprising that travellers arriving at a town should be the first attacked, when the disease was on the verge of breaking out among the residents. Much the same observation may be made respecting ships trading to a port at which Cholera appears: the arrival nearest to the appearance of Cholera is likely to bear the blame of having brought the contagion. If we assume that Cholera is contagious, and look only at those circumstances where it is *possible* the disease may have been communicated by personal intercourse; many circumstances may be found where contagion might be *suspected:* but proofs of the fact are wanting in India, while proofs adverse to the belief in contagion are numerous.

The character which the Cholera has assumed in many places in Russia, namely its going through a febrile stage in almost all cases, prior to the fatal termination; would render it possible that some modifications of the fever may be productive of contagion, among a crowded population, where numerous cases of the disease are occurring about the same time. However, the few accounts of the Cholera in Russia, which I have seen, describe precisely the blue Cholera of India, as predominant among the most early and most frequent cases of each local epidemic visitation; terminating rapidly without re-action, as it often does in Bengal. I observe that Cholera has appeared at some Russian stations, in violent forms; attacking persons residing in distant parts of the town, who had no sort of intercourse with each other, or with those who could be suspected of affording contagion: this was the case at Riga, as appears by the report of the Inspector *D. Dyrsen*, dated 14th May, 1831.

It is only by the most accurate inquiry at the time when the violent attacks of Cholera happen in a town, that any correct judgment can be formed whether the disease be contagious or not. A remarkable instance occurred at Razupna, where there appeared strong reason to suspect contagion; but after the most rigid investigation instituted by Dr. Schumov, it was proved on the clearest evidence, that there was no just ground for asserting that the Cholera had been on that occasion communicated by contagion. The circumstances alluded to were as follow:

In the year 1830, when the Cholera prevailed at Orenberg, a man went from thence to Razupna; immediately after his arrival at that place, he was attacked with Cholera, and soon died. Four days after this man's death, several of the garrison of Razupna were attacked with Cholera. A most careful inquiry was immediately instituted; whereby it was proved that not one of those who were taken ill, had seen, or attended on, or been near the man who was alleged to have brought the disease from Orenberg: but on the contrary, several persons who had visited this man and attended on him during his illness, escaped without suffering any sort of indisposition: the result of the inquiry, afforded complete proof that in this instance the suspicion of contagion was unfounded.

I leave the question, whether the Cholera in Russia has been generally contagious, to the decision of those learned physicians on the spot, who have such ample opportunities of investigating the characters of the disease. Having witnessed the ravages of the Cholera so long in this country, we have the most profound interest in the accounts of the nature and progress of the malady in Europe. When we observe that the inhabitants of the hill-provinces of British India live in small, close, ill-ventilated houses; and are clothed in woollen garments, which the poorer classes can rarely change; we might expect to find, that if Cholera were hereafter to appear in those distritcts, its characters may resemble in every respect the disease now prevailing in Russia. Without assuming that we have sufficient grounds, to deny that Cholera may be contagious in those countries of the north of Europe, where it now rages; we might ask, what good has quarantine and the cordon sanitaire done? Has it either prevented the appearance of the disease, or retarded its progress in any country; or can it be supposed to have excluded the Cholera from a single house or town, in half as many instances, as we know the severest forms of Cholera to have existed, where intercourse with the sick was in no manner restricted, and still the Cholera was not propagated. Whether quarantine regulations be deemed requisite or not; it is probable that the malignant nature, and rapid extension of the Cholera, may be modified and restrained, by improving the drainage and ventilation of towns and their vicinity, in those parts of the country where Cholera exists, or towards which it seems extending: by repairing the dwellings of the poorer inhabitants, and affording supplies of clothing and food, at such moderate prices as they can afford sufficiently to provide for their wants. Enjoining moderation in laborious occupations, and the strictest temperance in all habits: restricting the working hours in great factories, where the severity of labour, or continuance of occupation, appear very exhausting to human strength. We might also advise early attention to any irregularity of the bowels, whether from diarrhœa or from constipation; and the propriety of avoiding drastic or cold saline purges, whenever a disposition to Cholera has been manifested in the vicinity.

The early symptoms of most cases of Cholera, appearing connected with general disorder of the mucous membranes; it will be proper in cold seasons to observe carefully the progress of febrile catarrhal affections; for the purpose of ascertaining whether any relation exists between those complaints, and to notice their mutual influence on each other.

THE END.

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Is, in an especial manner, Dedicated.

BY

THE AUTHOR.

ERRATA.

There may, in this as in every other human production, be found a few errors of diction as well as of typography; but, as I wrote for the useful alone (not the ornamental,) so I have not given them a thought, or considered it necessary to waste time in their correction.

CONTENTS.

INTRODUCTORY PREFACE, ARGUMENT, AND GENERAL EXPOSITION.

CHOLERA, its continued prevalence and mortality. ....
The different forms of the epidemic. ii
Great importance of understanding their connection, object of the work to explain this, and to lay down the principle of treatment..... .... ii-vi
Anatomical physiological character of the work illustrated... .. vii
Cholera can only be illustrated by a comparison with the other forms of the epidemic... viii
Contagion, westering inclination, and diversified treatment of the epidemic alluded to. ix
Author's view of cholera, in 1826,.. .. ..
Old authors neglected; their views more correct than any that have since appeared, as far as I have considered them in reference to cholera, pestilential fever, and plague. xii
Spasms in cholera, their nature and treatment illustrated,.... xiii
Hydrophobia and cholera compared. xiv
Mistakes regarding the nature of the spasms corrected by personal experience. xvi
Cholera has never prevailed on the Neilgherries. xvi
Facts unconnected are of little advantage. .... *ib.*
Venesection alluded to, causes of its frequent failure explained. xix
Venous injection, causes of its failure explained. xxiii
Diluents, ancient practice of, revived in England, found more successful than any other means. xxvii
Water when impure, method of purifying, and of effectually destroying the animalculæ by means of carbonic acid gas, the existence of which, in the venous blood, and in the air passages, would appear to be a wonderful proof of the wisdom of design. xxix
Correspondence, in every particular, between the universal character and prevalence of the epidemic, and the universal adaptability and success of the natural system of treatment. xxxi
Bile, total deficiency in cholera, diluents promote its secretion, xxxi
Importance of the bitter principle; its general diffusion; resorted to by all nations in some shape or other; resorted to also by animals for the cure of their diseases; neglected by man in the treatment of ague, and he perishes; instance illustrative of its importance from Lieutenant Boileau's narrative. xxxv
Principal families of the epidemic to be illustrated.. xxxvii
Universal prevalence and association of these families... .... *ib.*
The consecutive fever productive of cholera, Drs. Barry and Russell. xxxviii
Comparative anatomy, statistics, illustrate the natural doctrine. *ib.*

Explanation of the three forms, cholera, ague, and dysentery.. xxxix
Cholera spasmodica ; author's three attacks of common cholera. ib. xli
Frictions often injurious. xii
Different positions of spasms, illustrated in reference to their danger. xlii
Different authors on the nerves. xli
Premonitory nervous sensations in the epidemic in Europe explained. xlii
Cholera, (apparently) without evacuations explained. xliii
Diluents of all remedies are those alone whose action in cholera are at all understood. .... ib.
Diluents their action illustrated by the principle of endosmose. xxx
Inconsistancy of those who proscribe fluids in cholera, but give them largely after a dose of physic. xv
Bad consequences of friction, and withholding of liquids illustrated by a familiar example. xlvi
Difficulties in forming the epidemic chain. xlv
Dr. O'Shaughnessy's and Steven's remarks on the blood in fever. xlvii
The epidemic chain traced out by practice and prominent facts, not by theory. .... ib.
Bile, importance of,—deficiency of in the epidemic, alkaline diathesis. xlv
The liver, the guardian and director of the primæ viæ. .... ib
Cholera without evacuations explained. ... .
Profuse and scanty evacuations cause of explained ; their consequences and effects. .. .. ib.
Epidemic and sporadic cholera, their difference. ...... ib.
Epidemic tree, its roots and branches, arterial and venous diathesis explained. lii

SECTION 1.

CHOLERA AND AGUE ; THEIR CONSANGUINITY.

CHOLERA, its symptoms different in degree in different places according to salubrity ; sometimes not to be distinguished from fever... 1
Different types of the epidemic always associated in the same place ; the converse also true, g. e. the Neilgherry Hills,.. 2
The places obnoxious to fever are the most liable also to cholera ; as the banks of rivers, bays, inlets, swamps, morasses, &c. .. .. ib.
Cholera and influenza compared, premonitory diarrhœa explained... .. ..
Epidemic influence illustrated by the effects of a known substance on the system. .. .. ib.
The epidemic probably caused by a principle of leaven, ferment, or yeast, rising from the soil, and diffused in the air. 5
Arsenic destroys or prevents the generation of this principle, hence renders unhealthy localities healthy ; and also cures fever on the same principle. .. .. ib.

Cholera and ague have the commencement of their train of symptoms about the same time... 6
In all the forms of the epidemic some of the conditions and the premonitory symptoms always present, particularly the dark thick condition of the blood. 7
Difference between cholera and a truly nervous disease illustrated... 7-8
Cholera and ague, their rise, progress, and termination correspond. 8
Prophylactic measures equally and eminently successful in every form of the epidemic; another among many proofs of their consanguinity. .. .. *ib.*
The rise of the different forms compared; recapitulation.. .. 9

SECTION II.

CHOLERA AND AGUE.

RESPECTIVE PERIODS OF INVASION.

The daily diurnal fever of life sways the actions of disease;—hence fever by day; diarrhœa, dysentery, and cholera by night. 10-11
The consecutive fever or premonitory diarrhœa exist, more or less, in every form of the epidemic that can possibly occur; because these two conditions in fact constitute the epidemic,.. 11
Cholera, dysentery, diarrhœa, quotidian, tertian and quartan ague, occur always in this order of attack... .. .... *ib.*
The daily stages of the natural actions of the system and of the epidemic, also the stages of diurnal, yearly, and more extended periods of time all correspond. 11-12

SECTION III.

CHOLERA; PHYSIOLOGY, PATHOLOGY, TREATMENT.

Cholera is developed during the natural collapse of the system, when the condition is favourable to the manifestation of the influence of the epidemic leaven. 13
Marshal Diebitsch's case, in illustration of the diurnal revolution of natural fever. 14
Diurnal natural fever, its exposition in reference to the illustration of the natural collapse the forerunner of the epidemic collapse... 15
Causes and consequences of collapse explained. .... *ib*
Commencement of changes in the alimentary mass; direct consequences of the same. 16
Irritation, or pain and spasm, caused by the contents of the tube. 17
Spasms may be so general and severe as to cause death........ *ib.*
The spasms hold a constant relation to the part of the tube affected; hence strictures or contractions in the colon are often

the cause of death, by preventing the discharge of the contents of the stomach and bowels. 17-18-19
Mucous membrane inflamed and often destroyed in cholera. .. 18-19
Correspondencc of pathology with dysentery and diarrhœa. .. 19
Spasms in cholera, their physiological explanation... 20-21-22-23
Lock jaw has been known to occur. 22
Loss of voice, explanation of. 22-23
Thirst, explanation of. 23
Viscidity of theblood increased by the spasms. ... . *ib.*
Bile in the liver and gall bladder is also viscid and thick....... *ib.*
Gall bladder pressing on the duct not the cause of cholera..... *ib.*
Urine often not secreted for some days after a severe attack of cholera, if there is much inflammation it is sometimes secreted. 24
Abdomen distension of, a bad sign. .. .. *ib.*
Epidemic invasion often obscure, and therefore extreme caution is necessary in the treatment of the febrile diathesis. .. 24-2
Natural tendency of the actions of the system to favor the development of cholera, illustrated. 25-28
Diet, the influence of illustrated by the glutton and epicure. .. 26
Expenditure of fluids, rough calculation of; Mr. Magendie only found 10 ounces of blood in some instances. .. 28
Blood sometimes poured into the intestines in cholera, as it is in dysentery. .. .. *ib.*
The blood in cholera, ague, or dysentery, changes according to the length and violence of the stages, in all these, at the commencement, it is blacker and thicker than natural........ .. 31
Bleeding in the Indian (Nagpoor) epidemic illustrated. .... *ib.*
The blood changes to the phlogistic character, according as the febrile diathesis is manifested. 32
Neither in cholera or dysentery do the diseased appearances in the tube, maintain a constant sameness of place or character;
Nor do the spasms in either cholera, ague, or dysentery; hence none of these, singly, are alone characteristic..... .. *ib.*
The London dysentery of 1670, in London, often fatal in 12 hours, it was the white dysentery or cholera.. 34
Cholera and dysentery compared. .. .... *ib.*
Blood always thick and black in pure cholera uncombined with inflammation... 35
Blood, thickness of, the cause of asphyxia—extracts from different authors showing the constant thickened condition of the blood. 36-37-38
Asphyxiated collapse not always fatal. 38
The blood affects the fœtus in utero... 39
Ague, its accession, appearance of the blood. .. .... *ib.*
In ague, cholera may be easily induced; the author was long in perceiving their consanguinity... 40-41
All the forms of the epidemic may occur at the same time and same place with great severity, as at Hydrabad. 41
Consanguinity of cholera and ague, illustrated by the effects of venous injection as well as by drastic purgatives....... 42-43
Cholera invades during the night, illustrated by field Marshal Diebitsch's case—explanation continued, and general re-

marks on the treatment pursued, which remarks are applicable throughout the whole range of the epidemic... 43-55
Venesection in the Nagpoor fever failed, explanation. 47
Venesection in cholera or poisoning fails, explanation. ...... *ib.*
Poisoned water the cause of cholera, this popular opinion should have led to more rational treatment. 48
The principle of cure illustrated in the exhibition of purgatives. 49
Symptoms ordinary, progress of development in reference to the 49-50
Treatment....... 50
Vomiting free and copious at first favourable. ...... *ib.*
Principles of treatment illustrated by the author's own case, and his remarks thereon... 51-52
The natural principle of treatment is universally applicable. .. 53
Destruction of animalculæ in water, by fixed air... .... *ib*
Danger in Cholera, (as common in poisoning,) is in proportion to the quantity of matters that has passed from the stomach into the small intestines. Morgagni... 54
Venesection, of itself alone, will often fail in cholera, the stomach and bowels must be cleared, leeches also often necessary... 56
Venesection relieves inflammation as well as takes off the pressure from the heart and lungs, and allows the lacteal and lymphatic fluids to flow into the veins... .... lb.
Bile, deficiency of,—importance of, alkaline diathesis deficient; indicated. 57-58
Carbonic acid gas in excess, a poison in cholera, ... 58
Illustrated by the effects of carbonate of soda on a full stomach. *ib*
Aq. ammon and aq. calcis neutralise the carbonic acid. Hydrocyanic acid found in the intestines after death in cholera. Ammonia said to be an antidote by some; denied... 59
Diluent alkaline treatment, view of in reference to the character of the epidemic. 59-60
Alkalies, ready mode of preparing. 60
Ammonia, instances of beneficial effects in the worst cases..... 61
Opium, when admissible. 61-62
Strychnia with diluents. 62
Cold water as a diluent invariably successful. 62-63
Distilled water, sponging the surface, free exposure beneficial... *ib.*
Indiscriminate covering up, frictions, hot bricks, &c, to the extremities injudicious. .... *ib.*
Venous injection. 64
Tobacco injections. .... *ib.*
Muriate of soda. 65
Sydenham's diluent. .. .. *ib.*

Stage of Reaction.

Stage of reaction in cholera cannot be distinguished from fever. 65
The sooner the vomiting and purging are checked the more danger in the reaction whether inflammatory or febrile....... *ib.*
After the fever has set in the cure by purgatives is contraindicated. *ib.*
Perspiration, Sanctorius on....... 66-67

The tongue is white in intermittent fever, it changes as the fever continues, or is neglected or badly treated. .... *ib*
Dysentery often the consequence of the bad treatment of fever. *ib*-104
Volatile alkali, effervesing draughts great importance of; certain cases requiring wine and other stimulants. .. 104
Mercury, its action in fever alluded to. 105
Opium, often advantageous, seldom injurious. 106
Opium does not decay readily. 106
Muriate of morphia.
Muriate of narcotine a powerful febrifuge. 107
Quinæ hydroferro-cyanas, the most powerful febrifuge... 107
Preparations of iron highly beneficial, instance in point. 108
The views of the epidemic confined to a particular principle, not to a particular remedy or medicine. 109-11
Piperine; found to be inert by Dr. W. B. O'Shaughnessy; native decoction serviceable.
Cold acid solution of quinine liable to bring on the fever; reason of this explained. 110-111-112
Muriate of narcotine, a powerful febrifuge, by Dr. W. B. O'Shaughnessy; trial of the same by Drs. Stewart and O'Shaughnessy; preparation of the M. Narcotive 112-115
Soda, its importance in the treatment of disease, its wide diffusion on the surface of the soil, by Drs. Thomson, Spry, Ainslie; Capt. Stewart. Dr. O'Shaughnessy; preparation of the pure carbonate.
Arsenic its influence in the cure of fever explained; in death the principle displayed " the eyes retaining their plumpness till the 7th day, the brain till the 16th. principle of cure displayed; its prophylactic powers. 116-120

Cases illustrative of the foregoing observations.

Case 1st (*called*) autumnal malignant remittent, from Dr. Good. 121-123
Case 2d—quotidian intermittent, Dr. Grierson. 123
Case 3d—remittent fever, Dr. Burnard. 124
Case 4th—intermittent malignant, Dr. Spry. 125-125
Case 5th—malignant, intermittent influenza, Dr. W.G. Maxwell.
Case 6th—endemic fever of Calcutta. .. *ib*. .. *ib*.

SECTION V.

DYSENTERY.

PHYSIOLOGY, PATHOLOGY, AND TREATMENT.

Dysentery, a minor form of cholera, more protracted, and the mucous membrane presenting ulcerations. .... *ib*.
This disease is very insidious, its possessor being unaware of its approach till ulcerations are established. .... *ib*.
Violent measures seldom attended with relief. 128
Prevailed in England at one time with great intensity, destroying life in 12 hours. .. .. *ib*.
Premonitory diarrhœa invariably ushers in dysentery. .... *ib*.

Diarrhœa, difficulty in tracing its passage into the febrile diathesis. 129
In 900 cases out of 1000, dysentery commences with diarrhœa; instances in illustration. 129-130
Secondary symptoms distinct. 132
Rise and progress of diarrhœa; commencement of ulceration. 131-132
Caput cæcum most diseased; progress of this disease. 133
Small intestines do not escape disease, colon suffers much, explanation of this, nature of and disposition of the ulcerations; contiguous organs involved; parts only of the mucous membrane affected. 133
Pelvic organs sympathise and suffer. 134
Depth of ulcerations; perforations, contractions, or strictures; relative situation of the colon accounts for the nature of its affection. 135
The ulcerations in reference to the hepatic radicles. 136
Hepatic affection, or not, in dysentery, dispute regarding explained. 137
Abscess in the liver, its nature &c. explained. 138
Fever and dysentery, their complication. .... *ib.*
Treatment, venesection to be cautiously practised, LEECHES OF GREAT UTILITY, followed by Ipecacuanha emetics; ipecacuanha, its action explained.. 138-139
Secretions to be improved in dysentery before the disease can be cured. 139-140
Experiments on dogs, tying the hepatic vessels, effects. 141
Cases illustrative of the influence of diluents or laxatives in the last stages. 142
Excessive depletion and excessive mercurialization injurious. .. *ib.*
Author's opportunities for ascertaining the pathology of dysentery. 143-144
Continued mortality from cholera, different modes of treatment. Author's attempt to point out the particular *principles* of treatment, not the particular remedy, which last is impossible,. .. 144
Laudanum, muriate of Morphia. .. .. .. *ib.*
Mercury. .. .. *ib.*
Ulcerations, their nature as explained points out the principle of treatment. .... *ib.*
Intermittent and febrile dysentery. 146
Leeches, aperients, mercury, opium. .. .. *ib.*
Opium antiseptic, ... *ib.*
Opium seldom injurious, instances in proof. 147
Black oxide of mercury, lime water. 147
Fumigation with mercury. 147
Castor-oil. 148
Dysentry in British Guiana. 148-149

SECTION VI.

MERCURY.

ITS SPECIFIC ACTION CONSIDERED IN REFERENCE TO THE TREATMENT OF THE EPIDEMIC.

Mercury often empirically administered, the author's ignorance at first regarding its effects, or ratio operandi,—&c. .
Author's views deduced from his experience in different attacks of the epidemic in his own person. The natural system adverted to. 151
Mercury by the mouth in the acmé of cholera,cannot be depended on. .. .. *ib.*
Cases illustrative of the diluent system.
Quantity of calomel given in one case. 153
Calomel lies unchanged in the stomach often. .. *ib.*
Black oxide of mercury, reason for administering. 154
Ptyalism from the B. O. often severe. .. ....
Calomel inactive, reason why. 154-155
Mercury, the nature of its action and necessity of adminstration exemplified in connection with diluents ... . *ib.*
Fumigation the most preferable method of introducing mercury; see Dr. Christie 1828 and Dr. Ainslie's mat. med. .. 156
Calomel,&c. their influence and action on the mucous membrane. vascularity, &c. of the mucous membrane, cause of (and vice versâ) physiologically explained. 157
Calomel, its reduction, and non-reduction, in the tube, causes, effects, and signs. 158
Ptyalism excessive, treatment of. 159
Inflammation of the bowels, fumigation should never be omitted ; reasons. .. .. *ib.*
Calomel often injures the tube by destroying the exudation which was thrown out to protect the mucous membrane...
Mercury will not cure the deep ulcerations. 160
Ptyalism in fever sometimes necessary. . .... *ib.*
Inhalation is the method of the introduction of the mineral in these cases. *ib*-161
Extraordinary cures therefrom, one instance related. .. *ib.*
Extraordinary cures without mercury, in reference and exposition. 161-162
Action of mercury in extreme case. 162-163
The different forms of the epidemic return during ptyalism... 163-164
The black oxide speedily induces ptyalism. 164
Corrosive sublimate, remarks on.
Alkalies, lime, &c. hasten ptyalism.
Mercury, its action in sthenic and asthenic diseases.
Mercury, its actions irritant through the pneumogastric expansions, illustrations. 165-66
Salts of mercury, their reduction generally by the system. .. 166
Salts of mercury tend to thicken the blood, by abstracting the alkalies, &c. .. ..
Mercury in hepatic disease, action explained, the black oxide preferable to all the other preparations, reasons for the same. 167-168

SECTION VII.

CONTAGION,

IN REFERENCE TO CHOLERA, AND ITS CONGENERS, PHYSIOLOGICALLY CONSIDERED.

Stages of the epidemic, their comparison. 169
Ague may become contagious.. .. .. .. *ib.*
Cholera, consecutive fever of contagious. .. .... *ib.*
Febrile stage of cholera, seldom in this country, applies for aid, therefore its prevalence not ascertained. 170
Popular opinion on contagion.. .. .. *ib.*
Action in the collapse and febrile stage compared, their comparative contagiousness, instance thereof.... 171
Pestilential fever, tendency to in cholera; it may hence hereafter be developed. 171-172
All the families of the epidemic live in harmony together. 172
The epidemic ferment according to its intensity, or various contingent circumstances, may produce any of the forms of the epidemic, and the time of development may vary in all. .. .. *ib.*
Epidemic influence may be exerted slowly or suddenly.. 173
Cholera, shivering in, a favorable sign.. .... *ib.*
Cholera, spread of, along the Coromandel coast, and from Madras, in 1837—mortality therefrom. 174-175
March of the 8th Regt. N. I. .. .. *ib.*
Multitudes tend to spread the disease... 175
Facts cannot be controverted.
Sydenham as a guide referred to.
Prophylactic measures equally efficacious in all the forms of the epidemic, instance in point, Cheltenham. 176-177
Prophylactic measures in England rendered the visitation of cholera exceedingly mild. 177
Ague, contagious, Dr. Good, Sir G. Baker, Drs. Fordyce, Ainslie, Smith, Christie, &c. 178
Cholera of various degrees of severity, of importance to be considered in reference to contagion. 179
Popular belief in contagion, instance in point. .. .... *ib.*
Cholera spread (1837) from the Coromandel coast towards the North Western Provinces;—its prominent routes alluded to. .. .. *ib.*
Its propagation (that is, all the forms) does not depend on one, but many causes conjoined. 180
Cholera is the quick, fever the slow step of the epidemic; A multitude of human beings though not perishing from the epidemic, may yet retain an atmosphere amongst them, sufficient for the spread of the epidemic among a fresh body of men, instance thereof. .... *ib.*
To avoid febrile localities is to avoid cholera, and all the other forms of the epidemic. .... *ib.*
63rd Regiment, Arnee, retained cholera long. 182

27th Regiment, march of, great mortality at Tripetty. .. 182
Typhus epidemic on board ship;—great mortality... ...... *ib.*
Cholera, in 1837, comparison with former visitations, pre-existency of the febrile constitution in all. 183
The author's declaration in 1826. Russel and Barry's confirmation, 1831, during the mission to Russia. ...... *ib.*
Non-contagionists, their accounts of epidemics similar to the author's with the exception of denying the agency of human intercourse—brief reply to the non-contagionists. 184-185
Broussai's opinion. 186
Dysentery, its character; great mortality. 186
Dysentery complicated with fever is (*like cholera in the consecutive fever stage*) *contagious*, by Drs. Halleran, Poole, Dillon, Cheyne, O'Brien. 187-188
Neilgherry Hills, epidemic has never occurred on, *unless taken up from below.* Dr. Baikie. 188
Cholera, nine cases in succession in one apartment. Drs. Ogilvie and Jukes. .. .. *ib.*
Troops in marching receiving cholera, is more in favor of contagion than against it;—exemplified. 189
A few instances (from among thousands) favouring contagion under certain circumstances. .... *ib*
Westering inclination of the epidemic. 190-191
Epidemic cholera, epidemic ague, and epidemic dysentery have therefore all been shown to be contagious under certain circumstances. 191
Miasm like a ferment or yeast. 192
The body in the latter stages of fever is like a marsh sending forth febrile ferment. .. .. *ib.*
The gaseous products in the tube in the choleroid diathesis often the cause of death. .... *ib.*
Carbonic acid gas, carburetted and sulphuretted hydrogen gases in the tube; the natural system of treatment removes these. 193
Recapitulation, recalling to mind, the hundredth time, that cholera and fever are links of the same epidemic chain, stages in fact of the same disease; hence that the contagionists and non-contagionists have all along been disputing about different stages of the same disease, as with the shield, one side of which was black, and the other white. 193

SECTION VIII.

WESTERING INCLINATION OF THE EPIDEMIC.

INFLUENCE OF THE EAST WIND.

The Epidemic has always been observed to arise or become aggravated during the prevalence of the east wind. 194
Apparent progress of the epidemic against the wind explained. *ib.*
Progress accounted for, by the ordinary course of winds. .... *ib.*

Salubrity of countries depends on the quarter and country from which the wind blows. .. 195
India as an example of the foregoing. ib.
Epidemics of China, Penang. 196
Currents of the atmosphere explained from Dr. Prout 196-198
Cholera appeared in London during the prevalence of the east wind. 198
In 1817 cholera became aggravated when the east wind began to blow. .. .. ib.
Febrile constitution antecedent to 1817—instances thereof. .. ib.-199
Great mortality in different parts of the world in 1817-1818 &c.
Dysentery, cholera, and ague, in the same locality as well as in the same march of the same corps; all these are merely parts of the same epidemic. 199
Abdominal fevers of London explained. 200
Consecutive fever of the Russians; their stamina. .. ib.
Epidemic, its intensity dependent on the character of the inhabitants, and salubrity of locality. .. .. ib.
The spread of the epidemic explained by the general currents of the atmosphere. 200
Versatile character of atmospheric currents in the temperate zone, and the versatile character of the method of progression of cholera compared. .. .. ib.
Tropical currents. 202
Partial or temporary exemption of Italy explained. .. ib.
Rapid diffusion of atmospheric influence exemplified, this would indicate that something else was necessary to the intense development of the febrific diathesis. .. .. ib.
Cholera in Great Britain, in 1817—Dr. Ayre. .. .. ib.
The spread of the great epidemic courted by the reigning constitution in 1817. .. .. ib.
Versatile character of the march of the epidemic explained. .. ib.
Monsoons have changed much within the last 25 years. .. 204
Great eastern currents of the atmosphere explains the westering inclination of the epidemic. .. .. .. ib.
Cholera, march of, through the world, interesting account of. ib.
The general characters of the epidemic, in marching through cities, provinces, or empires, have a constant fixed resemblance throughout. 207
The invasion of the epidemic in excessive intensity is always preceded by corresponding manifestations of the predominance of the febrific constitution. ib.-209
Influence of locality in accelerating the invasion of epidemic cholera. 209
Febrile ferment probably a palpable matter of the same description. .. .. ib.
Inferences from the gross nature of the epidemic ferment. .. 210
Influence of the moon on the atmospheric currents, consequently on the spread of the epidemic. 211
Deductions from influence of locality in modifying the violence of the epidemic constitution. 212
March of the epidemic, method of characterising, and forming the links of the chain explained. 213

APPENDIX.

The views expressed throughout the work have been derived from practical, as well as personal experience in both the choleroid and febrile diatheses of the epidemic. 1
Corresponding inferences deduced from witnessing numerous cases of cholera now prevalent in Calcutta. 2
The statements that cholera occurs occasionally without vomiting or purging leads to fatal conclusions. .. .... *ib.*
Symtoms in cholera are similar to those produced by many known irritants on the mucous membrane or central nervous expansion; hence the hitherto non-discovery of the particular poison is no proof that it did not exist. 3
Stimulants for the cure of cholera, recommended by those who do not understand the disease. 4
Carbonate of soda and Tartaric acid, their action alluded to and explained. 5
The public cautioned agaist anonymous scribblers. 6
Principles of treatment in asthenic miasmatic fever illustrated.. *ib.*
Carbonate of soda, its action in the cure of fever explained.... *ib.*
Mercurial fumigation for the cure of cholera in 1828, lately revived. 7
Mercury black oxide of, venous injection, reasons. ....
Distilled water, &c. by the ancients, mark of refinement.
Charcoal in fever, lately in cholera, action explained. 8
Chlorine; proposed as a disinfecter of the primæ viæ. .. 8
The prevalence of cholera in India and Europe at the same time, illustrates the westering inclination of the epidemic, and the wide spreading influence of the epidemic constitution.. 9
Every country, province, city, town, village or hamlet, has within its power the means of destroying or putting a stop to the production of febrile ferment, the fertile source of unhealthiness.. .. .. *ib.*
The same general principle of treatment applicable throughout the whole range of the epidemic.. 11
Treatment by cupping glasses to the region of the stomach known at Delhi in 1593; remarks. .. .. *ib.*
Venesection first recommended for the cure of inflammation in cholera in 1817. 12
Dr. Curtis's admirable description of the symptoms of the disease. 13
A poison passing through the primæ viæ will often leave behind it irritation, inflammation, and spasm, exactly as we observe in cholera; remarks, and instances. .. .... *ib.*
Strictures in the different parts of the tube in cholera often produce such a change in the symptoms as to cause a difficulty in recognising the disease. 15
That irritation and inflammation of the primæ viæ are the connecting links between the 1st and 2d stages, is strengthened by the observations of authors on the constitution of the *watery* dejections, and condition of the appearance of the blood in cholera as observed by Dr. Christie; the black colour

not being peculiar to cholera confirms my remarks in different parts of the work regarding the blood throughout the epidemic chain. 16
Secretions formed in the stomach and bowels, by Dr. Christie. .. 16-17
Dr. O'Shaughnessy on the serum of healthy, Cholera, and Bilious diarrhœa blood... 18
Analysis of alvine dejections. .... *ib.*
Conclusions. .. .. *ib.*
Plain directions for the analysis of the blood, and alvine evacuations in cholera. *ib.*-19
Constitution of the blood and alvine evacuations of the disease then prevailing in London. .. .. *ib.*
Identity of chemical pathology of cholera, in Newcastle, London, and Berlin. *ib.*-50-21
Excessive fatigue of itself will not cause cholera, explanation, application of this knowledge to useful purposes. 22-24
Mortality from cholera in Calcutta; during the Mohurrum and churruck Poojah festivals.
Proportion of deaths between the Mahomedons and Hindoos, .. 25
Black Pepper in cholera,
Roasted Berries of Black Papper in cholera,
Magnesia in cholera,
Bis-barri. Poison Pills of the Hindoo Hakeems, ... 26
Great object of the present treatise explained 23
Labours of hundreds wasted away in looking after an antidote; which attempts are chimerical; explanation.

TUP-O-WABAI

BIAN KIFIYUT TUP-O-WABAI-O-TA,OON KI DAR TIB-E-AKHBAR MAUSU-AST, NAVISHTA MISHAWUD. OR HISTORY OF THE PESTILENTIAL FEVER AND PLAGUE FROM THE TIB-E-AKHBAR.

Waba, explanation of the term.
Pestilence, causes of.
Predisposing causes, idyiosyncrasy.
Signs of an approaching pestilence.. 1
Symptoms of the disease enumerated, *important.* 2
Tup-o-wabai, the worst of all fevers especially when with ta,oon.
Treatment. 4
Directions for purifying the air of the house, &c.
Directions regarding drinks, their particular kinds, diet, &c. fumigation, &c.
Directions regarding purging, reasons for and against.
Preventive, and prophylactic measures and advice.
Anointing with ghee strongly recommended during the reigning of the pestilential constitution.
The internal use of similar substances, &c. likewise exhorted in these days. .... 4 to 8

TA,OON,

MUKALA UNDER TA,OON,

Or, Plague.

Plague, discription of the painful burning blisters, tumours, carbuncles, &c. prognosis, &c.
Treatment.
Refreshing beverages highly extolled, different kinds ; external cooling applications.
Purification of the air as in tup-e-wabai.
Treatment of the swellings ; free incision necessary, and the parts must be well washed out ; *faida.* 10
General treatment, prevention of fainting, and of the determination of the humours inwards.
After the tumours are opened, their contents must be drawn out (if necessary) by means of the suction of the mouth.
Fomentations, and other applications.
Food or nourishment, advice regarding.
Venesection, advice regarding, and difference of opinion mentioned. 11
The tumours to be opened before venesection be practised, to prevent the poison entering the system ; applications to the tumours to succeed. .. .. *ib.*
The strength to be supported after V. S. reasons.
External applications and adjuvants, faida. 12
Affections of the heart and brain respective treatments and advice regarding.
Dry cupping to the legs as a derivative from the brain......... 13
Hindoo hakeems, their singular opinion regarding the oil of the Sesamum orientale ; their treatment of the swellings, and their ideas regarding nourishment briefly alluded to. 14

HAIZA

BIAN KIFIYUT HAIZA KI DAR TIB-E-AKHBAR MANSU-AST NAVISHTA MISHAWUD, OR

HISTORY OF CHOLERA from the Tib-e-Akhbar. .. 15
Nature of cholera, general account of symptoms, exhortations to the physicians not to be dismayed by the apalling nature of the symptoms, for there is hope in the seemingly worst cases.
Children liable to cholera ; in them not dangerous.. .... *ib.*
In old people, in the strong and plethoric and sanguine, &c. dangerous.
Periodical attacks some are subject to, advantages; seasons most liable to cholera,
Proximate cause.
Cholera different kinds enumerated.; Haiza sufforavi, bulghami and saudavi ; symptoms of the first kind often severe, importance of clearing the stomach, and not checking the vomiting

and purging, burning of the stomach alluded to, cautions against eating 17
Support considered, tone of the stomach, and encouragement of the circulation.
Vomiting, relief of considered, means stated, drinks particularised. 18
External cold applications to the feet and hands placed in cold water and rubbed.
Cupping glasses to the region of the stomach if there is no relief to the vomiting and purging; and injection of decoction of poppy heads, &c. if still no relief. 19
Directions in case of fainting. 20
DISTILLED WATER from kid's flesh and spices, directions for giving
Spasms of the hands and feet, directions for treating.
Applications to the nape of the neck for the relief of spasms.
General advice regarding support, quiet, and repose.
After the violence of the disease is past, general directions regarding food, &c. 21
Kism-e-dooyum, consideration of the second variety or Haiza-e Bulghami, difference considered. 21
Ilaj, treatment or cure, great importance of clearing the stomach; the purging not to be stopt as long as the patients strength is not materially affected.
Directions regarding allaying the purging and vomiting, formulum for lozenges for that purpose.
The directions under the first variety are to be referred to for further information. 22
Kism-e-seeyum, third variety. Its nature and quality explained (or Haiza-e-saudavi, its difference from the two former well illustrated. 22
Symptoms particularised under 3 heads, ilaj, treatment or cure, the fluids must be thinned, they will then be easier discharged by vomiting and purging. 22
And other means to induce a discharge from the bowels to be had recourse to.
Rest, directions regarding, importance of. .. 23
Fomentations to the stomach; a moist and warm apartment at times beneficial, reasons stated. 24
Support, directions regarding.
Pain and burning of the stomach, treatment.
Sauda of the 3rd variety directions for purging.
After the severity is over astringents or other medicines may be given according to necessity, see the haiza-e-balghami and kism-e-awul for further information. 24

INTRODUCTORY PREFACE.

ARGUMENT, AND GENERAL EXPOSITION.

The unusual prevalence of cholera during the last few months in this country,[1] —the numerous instances of its fatal termination,[2] —the fact of its still continuing,—the likelihood of its again commencing in a similar manner on the eastern coast, and spreading as it has, on this and other occasions, done towards the west,—together with the fact of its extreme prevalence in Europe and in the vicinity of the overland route, have induced me to embody, in the few succeeding pages, the result of my observations on its nature and treatment, in the hope thereby of adding to the general knowledge of the disease, and contributing to the public advantage.

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[1] Since these sheets went to press a very recent and very severe instance *among many others*,of the extreme prevalence of the epidemic has been recorded. This was during the march of a body of troops (last month) from the southern provinces towards the northern Circars ;—two hundred and fif ty camp followers and fifty fighting men perished. The circumstantial fact that this melancholy instance occurred in a locality notoriously obnoxious to fever is singularly corroborative of the truth of the important doctrine displayed throughout these pages : I say important because the relationship which I have shown to subsist between cholera and fever points out the only effectual prophylactic measures on which,in despair,the traveller may safely rest as procuring exemption from the visitation of the epidemic ; not only, however, while travelling through a country,but likewise while remaining stationary in a place. Let the reader turn to those parts of the work having reference to this subject and he will receive the explanation in full.

[2] The public journals are full of accounts of these, and have been for the last eight months;—witness the instance of a lady and her three children near Salen ; that of the Rev. Dr. Darrah and Mrs. Darrah at Madras, &c. &c. &c. besides, innumerable others that are published,and hundreds of others that are not published.

The epidemic still continues to rage with unabated virulence in all its forms; it is, and always has been the universal disease, [3] which carries misery and death into every habitation; yet, regarding its real nature, the public continue in the profoundest ignorance.

How few are those [4] who possess any definite idea of the real nature of the pestilence, or who can face the disease, either in themselves or others, with any sure or fixed principles of treatment! Mine be the humble task of endeavouring to convey correct and defined ideas thereon, leading to the knowledge of the general principles of cure. In the acquirement of this knowledge alone can any hopes be entertained of a decrease in the mortality caused by the universal prevalence of the grave form of the epidemic: first, because millions are in situations beyond the reach of professional assistance; and second, because the rapidity of the disease is such that loss of time is loss of life. I have not confined myself to one particular remedy as is often done; this has been the stumbling block all along, the remedy has been trusted to in ignorance of the nature of the disease. In the case of Marshal Diebitsch, which I have given in the sequel, it will be perceived that, even venesection failed in the hands of experienced physicians, and death followed: therefore of what use is it to recommend a remedy without knowing how it acts, or why and when it is indicated? there is no want of remedies, but a want of general knowledge of the nature of the epidemic, and a consequent inability to apply the simple and only natural principles of treatment.

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[3] In the forms of cholera, dysentery, and epidemic fever, which prevail in one shape or other (*continually* and *universally*) throughout the world; and which I have endeavoured to show to be different stages of the same epidemic.

[4] Professional excepted.

To the public, therefore, these pages are addressed. They will find them divested, as much as possible, of technicalities, and written in as clear and simple a style as possible that they may understand; they will, it is hoped, find in them, the features of the malady depicted in lineaments which cannot be mistaken; they will be enabled to reason on its essential character, and hence to pursue, with less fatal uncertainty, the means best calculated to break the violence of its approach; they will be enabled to trace the passage of the epidemic into the febrile diathesis, and hence, perceiving the connecting links, they will no longer wonder at the prevalence of fever at one time, and of cholera at another, or of both these together at the same time, and in the same place; they will learn that the only principle of cure, must consist in assisting the natural efforts of the constitution, and hence that it must be simple, and as universally applicable as the epidemic itself is universally prevalent; knowing the simple principles of cure, by the application of which alone the disease can be carried off, they will learn to avoid those poisonous nostrums that have slain more victims than the epidemic itself, whether in cholera on the one hand, or its febrile stage on the other; learning its connection with fever, they will avoid the localities obnoxious thereto, and hence will also be enabled to discern the origin of the conflicting opinions on the contagion of cholera; in fine, at one and the same time, they will perceive and understand the frame-work of the great pestilence, whether in the collapse of cholera, or in the acmè of continued fever; they will not in these pages be constrained to labour through labyrinths of labyrinthian theories, but comprehend at once the rise, progress, and termination, of the epidemic; they will not be burdened with the task of recollecting new fangled doctrines, but will be agreeably disappointed to find that they are only reminded of what they already know, and every day experience themselves in the natural actions of their own systems, or view in those of others; they will find this natural doctrine a happy relief to their minds, and they will no longer survey with horror and despair the approaches of the epidemic; their minds will be divested of all useless theory; they will toss aside all doubtful and pernicious nostrums, and wheresoever they be, whether on the sands of the desert, or in the crowded city, will equally be enabled on rational principles to combat, *by natural means*, the attacks of the epidemic in all its forms; in exploring unknown regions, while extending the boundaries of knowledge and civilization, they will recognise the fell destroyer in the form of dysentery or ague, and, no longer wondering at the diversity of disease, will meet the epidemic on natural principles of cure.

These point to a few subjects of vital importance in the history of the epidemic, the clear and defined knowledge of which must be beneficial to mankind.[5]

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[5] I am anxious not to swell these pages by bringing forward innumerable instances in support of these views, I may probably do so at another time; I will only here refer to one instance, where, of seventy-two labourers shipped last year from the port of Calcutta to the Isle of France, sixty

In the heart-rending accounts of the last expeditions of discovery to Africa, tere is the melancholy truth displayed of the universal prevalence of the epidemic in its various forms, and the no less universal ignorance regarding their dependent relation. Of what incalculable benefit must it not prove to future expeditions, when those composing them become acquainted with the natural doctrine of the epidemic, and its[6] naturtl system of cure; they will understand the connection between fever and dysentery, and their intimate relation and dependance, and will learn to husband the lives of unfortunate sufferers, while they combat the secondary symptoms of disease. The contracted

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died of dysentery on the passage, and the remainder perished afterwards on the small Island, in quarantine; the unfortunate men had been exposed much before hand from the circumstance of its being their third time of shipment the two former vessels having put back. About 10 of the crew also died on the passage. The debility attending this febrile diathesis was extreme, the individuals being frequently found dead in the posture in which they had reclined or sat down on the deck and other places. The above I had from an officer on board the ship in question. In the same way do the expeditions alluded to terminate; dysentery is the termination of the febrile diathesis, the cure of this last prevents the development of ulceration and the secondary symptoms.

Since the time I began to consider the epidemic in the manner I have endeavoured to display throughout the following pages of the text, I have experienced much satisfaction in the treatment of the various forms; the reader will perceive the reason of this as he reads; he will perceive that the choloroid and the febrile, or what I call the same, the venous and arterial diathesis require different modes of treatment, but that a knowledge of their connection is necessary, because they so run into each other that nothing save a previously acquired acquaintance with the consanguinity of the different forms of the epidemic could give rise to a clear conception of their dependent character.

Hitherto the whole appeared a mass of confusion, and medicine a system of chance; now I find the natural system alone enables me to prescribe upon a constant unchanging principle, certain in its object, and invariable in its effects.

view which surveys dysentery as a topical affection, has buried in the interior of Africa the greater part of the last expedition; while this topical affection engaged all attention, the lamp of life was disregarded, and, wanting support, the flickering flame expired.

The pestilence it appears, from the latest accounts, is again approaching the shores of England, in the form of cholera. I long that these pages reach the happy Isle before the destroyer gains his strength; they might infuse new ideas of utility amongst the influential, and also contribute to the alleviation of general distress, whether in the direct application of the principles of cure, or in the tranquility of mind that must attend a knowledge of the nature of the different forms, and the connection especially, between cholera and influenza, which, however, alas! before these pages reach England, will probably (following in the wake of the former, or vice versâ) have spread from shore to shore.

I have endeavoured, in the sequel as much as possible to avoid dry detail, and consequently have not burdened these pages with long and tedious descriptions of the different forms of the epidemic; these, and all their species and varieties are to be found in books; I have only confined myself to the useful task of tracing their relationship, and thus pointing out the character of the epidemic; in doing this, I will unavoidably allude to the anatomical physiology of healthy and diseased action, but it shall be, as much as possible, in a style that will rather amuse than cloy, and interest rather than disgust; because the reader will perceive that the whole superstructure rests entirely upon this anatomical physiological relationship, without which there could of course be no possibility of proving their consanguinity, or of tracing the epidemic chain.

Some of these anatomical pathological facts, such for instance as those pourtraying the nature of dysentery, are new, and throw considerable light on the character of the epidemic; others are also equally interesting, and their application sheds a new light on the nature of the spasmodic symptoms.

It shall be my endeavour to explain, as I have said, in easy and familiar language, the anomalous features often presented by the pestilence, as it occurs in all its varied forms of severity; and this shall be done, not by the uncertain assistance of more uncertain theories, but by a reference to plain downright matter of fact.

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[7] For instance, if the spasms were observed to follow from the right leg to the left, according as the contents of the bowels passed along over corresponding portions of the mucous membrane, it would point out the origin of those spasms, and the treatment to be pursued. This I have observed first in my own case, and then in that of others.—This is an instance of what I call plain down right matter of fact, and no mistake; and of great practical importance in the treatment as I have shown.

I am not aware if this important fact has been remarked by any one hitherto. If not it should have the effect of making ignorant sneerers blush' who, while they will not be at the trouble themselves to study the disease for the benefit of their fellow creatures, condemn every endeavour on the part of others to add to the knowledge thereof. For such individuals I do not write. I do not ask them to read these pages. For thus will always fools exclaim, while the disease is raging around them, ignorant of its nature, or the plain and simple principles of cure.

The above single fact (independent of there being many others) pointing out the nature of the symptoms, and principles of treatment, is sufficient of itself to demand a volume for its exposition. But even leaving out of the question all the important practical facts brought forward, the very endeavour itself to remove the disease from the obscurity in which it has been involved, I will not attempt to dive beyond my depth into the hidden mysteries of nature, but confine myself to the explanation of appearances presented to the naked eye.

These, it is not too much to say, have hitherto received but little of that attention they have all along deserved; for while there has been a vain and ineffectual search after the one first cause, the more important and practically useful points have been often totally disregarded, and the disease itself deemed to be inexplicable.

In opposition to the foregoing method of considering the malady, I shall pursue a different one and the only one which affords a chance of unravelling, the *apparent* inexplicable confusion of the symptoms of the disease. This will consist in tracing the connection with the prevailing types of the pestilence as occurring during the reigning of the epidemic constitution, and, in doing this, the character of the malady, (more especially in view) will receive a lucid illustration; while the other types, no less important in reference to the health of mankind, will partake of the equally new and useful exposition.

Connected as they are all found to be, it will be impossible to separate them from one another while explaining the phenomena of the disease; and thus, at one and the same time, the illustrations will apply to every form of the epidemic.

The question of the contagion of cholera, of which the same limited views have been all along entertained as regarding the disease, will be illustrated by that same method which will be found to explain the nature of the

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will meet with that consideration it deserves from those especially who consider this obscurity as still presenting a blot on the escutcheon of science.

malady itself; and, being dependent on physiological principles, the question will be found to be decided by the character of the prevailing epidemic in particular, not by that of the malady denominated cholera in general.

While the principal type, in reference to contagion will thus be fully illustrated, so the other forms of the pestilence, true to the general law, will be found to preserve a corresponding reciprocity, and that, whilst under one variety of development they are harmless, in another they will show a contagious disposition.

The singular yet constant disposition the epidemic has shown of spreading towards the west, will be also considered, and will lead to a reference to the prevailing currents that circulate round the globe in a similar direction, the knowledge of which, although perhaps familiar to all, yet is required to be here applied to elucidate the present subject.

The most important subject of all, the treatment, will be laid down, and explained on obvious physiological principles, intelligible to all, and equally applicable in all the varied forms of the pestilence, and under every circumstance of time, place, or severity.

This will afford to the mind a relief from the contemplation of that chaotic assemblage of varied and opposing remedies that are constantly presented to the bewildered imagination.

How opposite are the modes of treatment that have been each strenuously set forth by their respective advocates! While in India, abstraction of blood was considered by many the only rational mode of treatment, in England, the very opposite was often had recourse to, and fluids were injected into the veins; while water was considered poison in India, in England the patient was allowed to drink as much as he desired; mercury in India was highly extolled, in England it was often considered injurious; opium had its strenuous supporters in India, in England it was a failure; stimulants were continued to be given by some in India, in England and Europe they were almost universally condemned; in fact, there is scarce a medicine that has not been at one time brought forward and again abandoned: under every treatment some have died, and others have recovered; and many, without any treatment at all: nay, individuals have actually recovered who have refused, either to be bled or injected.

In 1826, when I first saw the disease, called asiatic cholera, I considered it the aggravated type of the reigning epidemic which then prevailed, and, in conformity with that view, drew up a statement of the different forms; and which statement was published in 1826, in the 6th No. of the Edinburgh Journal of Medical Science.[8]

It was then thought by many that cholera could not prevail in Europe; but, if there was any truth in the arrangement I had made, it was evident that it could as well prevail there as the other forms of the epidemic; and consequently it unfortunately did prevail, *reaching England six years after the time that I had designated it the severe form of the reigning epidemic.*

Since then I have had many opportunities of witnessing the epidemic in all its forms; and every observation I have made has only tended to confirm and strengthen my former experience.

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[8] Republished in the No for Sept. 1837, of the India Journal of M. & P. Science, Calcutta.

The fact is, that these different forms so constantly intermingle with each other, that it is impossible to consider one without the other; and so great is the benefit resulting from this, that each contributes to illustrate the other,so much so indeed that, although I had considered the consanguinity of the different types eight years ago, yet had I not witnessed the intermingling of these upon an extensive scale in the Coromandel jungles, I could not have drawn out a connected series of observations, touching these same maladies in general, and cholera in particular.

Every circumstance which I have observed in connection with these diseases, has only tended to confirm and demonstrate the correctness and value of the writings of many of the older authors on epidemics; and, had they been more attended to and regarded than they have been, the faculty in Europe, and England in particular, would have been saved the trouble of the search for a panacea in cholera, in trying every article in the pharmacopœia for the cure of the disease: for they would have found in the works of Sydenham, those principles of treatment described, which, at the eleventh hour, were at last had recourse to in the cure of the prevailing epidemic.

In this country, too, the same advantage would have been derived from consulting not only the older English authors, but also those Persian writers, who compiled from the Arabians (by direction of the conquering Princes of the crescent) histories and descriptions of epidemics for the use of their armies, that these last might not, when visited by them, suffer from ignorance thereof.

In these writings, we accordingly find cholera in its different forms,fully illustrated in a manner that would make blush the refined technicality of the present day.

The long dispute about the bile in these our days, as being absent or not in the cholera of by-gone centuries, would have been saved by a knowledge of the Persian writings, for in these are described the different varieties of the disease.

The plague too, which has, even at our very thresholds, caused much controversy and dispute, and will again cause it, (thro' the perversity of human nature) is in these works fully described; and the premonitory or pestilential fever which precedes it meets with an equal share of lucid illustration: the propriety of bleeding is discussed, the principles of general cure laid down, and the great importance of opening the carbuncles, to allow of a free discharge of the matter of the plague, is pointedly enforced: the anointing with oil is likewise recommended.[9]

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[9] It is my present intention to affix a description of cholera and plague in the Persian language from the celebrated work of Mahommed Urzanee. They will be found replete with interesting and useful information. Their study will enable the general reader to comprehend with facility the principles inculcated in the text, both in the collapse and febrile stage of the epidemic. I have taken advantage of the opportunity of also adding the second chapter on plague a subject at present so nearly concerning the interests of this country ; none will be a loser by the careful perusal thereof. Besides, the introduction of these, in the Persian language, will encourage inquiry among those from whom alone general benefit can be expected to result from a knowledge of the nature of the epidemic, and the simple principles of cure.

When considering the symptoms attendant on the disease, and not a part of it, but arising from it in many cases, while in the worst forms they are often absent, the presence of spasms will be particularly attended to, endeavouring thereby to save unfortunate sufferers the additional torture resulting from the application of scalding water, &c. to the extremities; a measure replete with misfortune to the patient, in reducing still lower his nervous energy, and productive of no relief, because the origin of these spasms is in the intestines. Yet I have no doubt but that many unfortunate sufferers are undergoing this unnecessary operation while I now write.[10]

To illustrate this for the general reader; let him recollect if he has ever had an affection of the liver, attended with pain in one or both shoulders, and he will understand what I mean; as well as that he will perceive the total inefficiency that would attend the application of scalding water or other irritants to the shoulder for the relief of his hepatic affection.

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[10] Witness hysterics: this will illustrate better than any other disease what I wish to point out to the general reader; first the independent nature of the spasms (that is, that in the worst cases they are absent and are not an essential part of the disease) and secondly, that however violent they may be, no application to the seat of their development is attended with relief. Hence do we see that in hysteria the patient remains for days together with various parts of the body more or less in a state of spasm,—these very parts in fact which are effected in cholera; yet death does not follow. The same system of nerves is affected as in cholera, but then there is wanting the febrile epidemic constitution. When this last is added then do we see it rapid in its progress and development in such cases, because the previously acquired tendency to contractility is ready to assume the action at the moment of invasion;—or I should rather say that the disease makes an easy victory when engrafted on this irritable condition of the system.

And it might be useful here to allude to another affection of the nerves as illustrative of the principle described, and that is hydrophobia. In this the original injury or disease is evident and external, and the development of subsequent fatal symptoms takes place in the involuntary and vital system: whereas, in cholera it is internal, not visible but perceived.[11]

This, the most dreadful of all diseases, appears to be treated, like the spasms in cholera, upon the same erroneous principle of attacking the disease at the wrong end; which is principally and fearfully displayed in the administration of liquids, inducing a return of the dreadful spasms threatening instant suffocation. These liquids are as hurtful and as unnecessary as the scalding water to the legs in cholera. The only chance of life consists in intercepting the progress of disease, by division of the nerve or nerves, and thus cutting off the connection, or breaking the chain before the respiratory columns become materially involved. Nor should this ever be omitted, even after the occurrence of paroxysms, because there are intervals of *perfect* composure, showing that the repulsion of the nervous matter has temporarily but partially suspended the progress of abnormal action, which unfortunately again soon springs from the original seat, as it did at first.[12]

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[11] *i. e.* the individual is conscious thereof.

[12] Nothing so clearly illustrates the fallacy of human reasoning as the circumstances connected with the present treatment of hydrophobia and cholera. In both the spasms are encouraged, in one by the exhibition of liquids to irritate the nerves, and the neglect of the original cause. In cholera by the withholding of liquids, the neglect of the original cause, and the application of irritants to the extremities, at the greatest distance possible from the origin of the spasms, and the seat of the disease.

In cholera a similar error has been committed, the spasms having been mistaken often for the disease itself; this has resulted from not recollecting that the bowels, though apparently internal, are actually the external roots of the animal tree turned inwards, into the position Providence has placed them. The affections of the roots produce corresponding spasms, which return at intervals in the muscles of that part of the system bordering on the exciting cause, and these are propagated along the corresponding nervous columns. And so I have myself experienced in the disease, the spasms returning at intervals, and having a strict reference to the portion of the intestines more particularly affected, *changing generally from the right extremity to the left after each evacuation.* For the relief of these symptoms, neither bleeding, or injection, or calomel, or opium, were had recourse to; yet, had I been treated by any of these, my recovery would have been attributed to the particular remedy, and the respective advocates of the particular system would have instanced the case as one illustrative of the success of their particular measures.

It is thus that so many medicines recommended for the cure of this disease have subsequently fallen into disrepute after being highly extolled; and it is thus too that such adverse opinions still exist regarding the real nature of the epidemic: because many of the views which have been advanced, have been deduced from a few examples, or from a few successful cases treated by particular remedies, and not from the consideration of the epidemic in every form, and in every country.

Not only in connection with the treatment have errors been propagated, but likewise from failing to observe the habitudes of the disease, as for instance its constant fixation in some localities, and its constant absence from others in all its forms. As an example of the latter may be instanced the Neilgherry hills,upon whose summits they have never prevailed, yet around whose base they are frequently arrayed in fearful display. If all the forms therefore exist in one place, intermingling with each other in interminable succession, we may conclude, without fear of contradictory proof, that, if one of these forms should prevail epidemically in a locality hitherto totally exempt therefrom, the others will also equally be found to prevail in a similar manner sooner or later; or in other words, that if the milder form exists, the severer is not far off, and will in its turn prevail for a while in the stage of lengthened collapse, from which there will be a gradual escape as the epidemy continues, till at last the cold stage becomes so slight, that we lose sight of it and only observe the febrile development which now marks the reigning constitution.

Thus, therefore, it is that general observations illustrate facts better than facts themselves, which might, indeed, be accumulated for centuries, without any useful result, as long as they are not made to elucidate one another, or combined, as it were, to produce useful compounds.[13]

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[13] I mean that of facts we already know an infinity; it is their association, the drawing of them together, their being individually made to illustrate each other, in other words, their classification that we want: this is what I have endeavoured to do, viz. to make one fact bear upon another throughout the whole range of the epidemic from the collapse of cholera to the acmé of continued fever: to make them all in fact revolve in a circle, a continued chain of symptoms linked together, inseparably connected, and depending

The distorted views that have been taken of the disease, and the oversight in not perceiving its connection with the other forms of the epidemic, have given rise to those constant changes in practice, which have presented such a varied picture of doubt and confusion, and which is still often presented to view in those descriptions which are daily laid before the public. Venesection, for instance, which was strongly recommended in the treatment of the epidemic when it reappeared in India so long ago as 1817, by Dr. Corbyn, in a letter which was circulated for general information by order of the Marquis of Hastings, was not followed by that success,[14] and consequently did not meet in Europe with that support which attended it in India more or less.

There can also be no doubt that it was often practised in this country where it might have been omitted, and hence the cases would be thus adduced, erroneously, as instances of cure by venesection. Even at the present day scarcely two physicians will be found to agree in their views of venesection: some consider it an antiphlogistic

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for existence on one another, like members of the body, so that leave out which we may

"Tenth or ten thousandth breaks the chain alike."

[14] "The same practice is commended by many of the most judicious and enlightened physicians of Europe; but it does not appear to have been carried to the same extent, generally speaking, in that quarter of the world as in Asia. Whether the want of boldness in this respect has been the result of experience, does not clearly appear. We certainly have not met with distinct statements from any European physician, so favourable to this mode of depletion, as those which we have quoted from the Anglo Indian practitioners It is equally true, that the results of medical treatment generally, in Europe are less flattering than those in India."—*American Report on cholera.*

remedy in this disease (cholera); others again an antispasmodic; a third that it relieves congestion; a fourth that it takes off pressure from the brain; and a fifth cannot perceive it have any influenee, or that it should be practised.[15]

All these contrary and opposing opinions have originated in the different views that have been taken of the disease, by those who have respectively observed diversified types of the epidemic.

It, therefore, is no wonder, that a remedy, thus empirically abused, should, even if it was a specific, fall into disrepute: for it is evident that, if thus used, it would often be had recourse to where not only the spasms, but also the pain, arose from mechanical agency, and hence it could no more remove the cause thereof, than it could a stone from the bladder, or a cataract from the eye. This is well exemplified in hydrophobia; here the spasms are brought on by the injury and disease of the nerve, and, as long as the latter remains, all remedies are unavailing; hence individuals have been bled till the blood almost ceased to flow, without the slightest benefit; on the contrary, death was generally accelerated. In the convulsions, so common in children, we also perceive the principle well exemplified, and which neither venesection nor external remedies will remove. An example, illustrative of this, occurred lately in my practice in the child of a European non-commissioned. When I saw it, it was in a state of perfect external insensibility; it had been fired with a red hot iron on the ankles, wrists, arms, and neck, by its parents, for the relief of the convulsions. I directed an emetic, in a quarter of an hour vomiting came on, and a heterogeneous mass of indigested substances was with difficulty ejected; in ten minutes the child was perfectly well, *with the exception of the firing.*

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[15] Some medical men actually recommend the abstraction of blood in every case. It is melancholy to see such opinions among some of the profession, knowing as they must do that many sporadic cases of cholera would thus be subjected to a line of treatment unnecessary and injurious. The difference between the sporadic and epidemic forms is great indeed, and requires to be known to estimate the utility of venesection. *Gratia exempli.* A family on the coast of Dumfrieshire, in a state of starvation, found on the sands a large fish which had been washed ashore; it was putrid, but their hunger overcame all scruples;—they prepared and partook of the fish; they were all attacked with cholera; these cases were sporadic; the cause was local and topical, there was no asphyxia, the forerunner of death in the lowest cases of collapse in epidemic cholera. Yet according to the doctrine and theory of some, all cases of this kind should be bled; will the bleeding remove the putrid fish (or any other matters that may have been swallowed) from the intestines? certainly not; but diluents would assist in carrying them off on the same principle as they act when we take them to make a dose of salt operates. If a dose of salts griped we would not bleed, we would swallow abundance of diluents. Why is the principle not followed up in cholera?

So in cholera instances will occur where the symptoms will not be relieved by either firing or venesection; hence we find cases related where five pounds of *red* blood have been extracted, yet the patient die; because, although it will relieve inflammation, it will not remove the cause thereof, in whatever part of the bowels it may happen to be situated. This is clearly and at once illustrated in the instance of poisoning by arsenic or corrosive sublimate, which, if they descend into the small intestines, soon destroy life by the inflammation they induce, and the consequent tension of the columns of the involuntary or vital system of nerves: it is perfectly clear that venesection in this or similar instances would hasten death. We have here inflammation, running into mortification without a hope of saving life, simply because we cannot remove the cause. But if this cause has not passed down from the stomach, then there are hopes of saving life by the exhibition of antidotes and emetics.

And so in cholera has cause been mistaken for effect, and both opprobrium and eulogy heaped upon the lancet. Upon no other principle can be explained the numerous deaths that constantly occur from cholera, as remarkable in the last as the former visitations; husband and wife, or wife and children, cut off, in the same family in repeated instances.

There would be no greater service conferred on the community than the giving the particulars of the cases of deaths of individnals, known to the public, who have been suddenly cut off, by the epidemic; the relation of events would be equally an object of general interest as the sufferers themselves; extended knowledge would be daily gained, of vital interest to all and each hourly liable to a similar visit from the disease which had, under certain circumstances, destroyed their predecessors, but which, now being known, are avoided. Thus might the public collect a body of useful facts, which would sooner illustrates the general characters of epidemics than the laboured disquisitions of centuries.

Corresponding with the appalling features of the disease it would be expected that on examination after death some sufficient cause would be discovered to account for the disease. Strange to tell however, if we consult many of the accounts of the dissections that have been made, we shall find it there related that no appearances in many cases could be discovered *sufficient to account for death.* Such is the fallacy of human reasoning! In every case that I have seen, and heard of, there has been cause, and more than cause in my opinion, *sufficient* to account for death, in the thickened viscid tary condition of the blood, which *is universally* present in every case more or less. Yet it should not be forgot that this fluid will change during the inflammatory symptoms, as in the case of poisoning alluded to; or as it will do in ague, or in dysentery, in which last disease, at the final stage, when perforation of the bowel has taken place, (either complete or partial) and established peritonitis, the blood will present a buffy coat, altogether different from the original character of the fluid as presented on the supervention of the epidemic, when it was never found, to present the inflammatory characteristics.[16]

And so, in cholera *in the very worst forms of the pure type of the epidemic venesection is a failure* and the history of the disease in England presents the singular and opposite circumstances of

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injection of fluids into the veins being had recourse to instead of abstraction of blood.

„ This new remedy for cholera, however feasible it appears, soon partly shared the fate of many others, while some esteemed it of advantage, others did not find it succeed; while in the hands of some it was the means of raising from the dead, in the hands of others it sent the patients to their graves. All must allow however that where it has cured in hopeless cases, that there venesection would have hastened death; but that the converse will not hold, which is illustrative of the principle of cure, and explanatory of the nature of the disease.

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[16] Leaving out even this evident and tangible condition we have enough in the presence of the spasms to account for death, knowing as we do the origin of these, even supposing that the marks of irritation on the mucous membrane of the stomach and bowels was *to appearance* inconsiderable and insufficient to enable us to account for death.

That many tried it under adverse circumstances, and where it was contra-indicated, there can be little doubt, judging from the various reports on the subject, and the multiplicity and contrariety of remedies advanced as cures for the disease.

The attention of the profession in England to this treatment by injection of fluid into the veins was first directed by W. B. O'Shaughnessy M. D. who thus adverts to the subject in his manual of chemistry.

" On these data, I felt warranted in recommending that in desperate cases of cholera, when all other means of cure were obviously hopeless, that the water and saline matter deficient in the blood should be restored to it artificially by injecting these substances through the veins. (See my report on the Chemical Pathology of Cholera, published bythe Central Board of Health p,54 July, 1832.) The operation was performed by Drs. Lewins and Latta of Leith, in the following month, and with perfect success, and Dr. Girdwood, of London, rescued by its means five utterly abandoned cases. In many instances it was unsuccessful as might be reasonably expected; for death had already secured the sufferers. In some cases the measure failed through the inexperience of the operators, and the introduction of air into the veins. In no one instance has it ever accelerated the progress of the disease, or produced any symptom indicative of its having itself occasioned harm: seventeen cases are now recorded of its success; and, as its adoption is only recommended where all other remedies are given over in despair, I regard the operation as one which should always be resorted to before we consign our patients to the grave or the pyre."

The failure of this remedy in the hands of many may be attributed to the same circumstances as these already stated, as connected with the contrary opinions regarding venesection, and to the fact of many trusting to it alone, and not removing the cause of internal irritation in the bowels: hence it was often found that the fluid ran off by stool as soon as it was injected into the veins, because there was an irritation in the tube which the animal sensibility knew was to be got rid of, and which it does by directing the action of the muscles and the flow of fluids towards the part affected, as we see in every action of the system; such for instance, as that common one of vomiting, where the fluids are first directed to the stomach, œsophagus, and pharynx, and then vomiting succeeds, and the offending matter is discharged.

And, in the case of poisons, worms, or other offending matters in the intestines, which the system has not succeeded in expelling, the membrane throws out an exudation to protect itself, and, in many instances, completely envelopes the irritating mass in a distinct covering.

In the case of worms, particularly, is this exemplified, where the bowelthrows out this exudation to protect itself, like an additional internal coat, in which the animals burrow instead of in the villous membrane.

In the abdomen of quadrupeds this process is often exemplified, particularly in horses and dogs,[17] and the danger attending the exhibition of drugs which remove this exudation without killing or expelling the worms is daily verified, because they attack the mucous membrane with redoubted vigour, from the circumstance of their being deprived of the substances on which they formerly subsisted; inflammation, mortification, and death succeed, as I have seen in many instances.

In cholera, the irritation (of a different kind) existing generally in the low cases, in the inferior portions of the tube, continually draws the fluids, that have been injected,

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[17] The worm which is commonly known by the name of the cork-screw worm is extremely destructive to dogs. I have seen numbers perish from them; the young worms have an apparatus by which they adhere to the mucous membrane, and are thus enabled to maintain their position in the higher portions of the tube. Their number has been at times inconceivable, and the whole mucous surface of the bowels was covered with the choloroid exudation, thrown out from the irritated membrane: when the inflammation extended through to the muscular coat then death took place, and the intestines was found dark coloured with its coats thin and shining. Not aware of the nature of the similar exudation in cholera some have supposed it peculiar to the disease; but it so happens that in protracted cases there is none found, evidently showing that it has nothing to do with the specific characters of the disease. In a word, the exudation is a protecting covering which nature gives to the mucous membrane, and it is injurious to remove it while the cause of irritation remains in the intestines. We are too apt to draw hasty conclusions when we cannot perceive a cause; and these too at direct variance with the operations of nature herself, and with those measures all have recourse to to alleviate violent irritation in the intestines. Are not demulcents, emulsions, mucilages, milk, oils, fats, yelks of eggs, &c. all had recourse to to sheath thebowels in the case of poisoning? and yet behold the adverse unnatural system of some in cholera, in attempting to remove that natural sheathing which nature throws out to protect the bowel.

The presence of carbonic acid in the bowels is also fatal to worms and animalculæ that may be there. The worms are either destroyed, or else to that particular part, and they pass off by stool; shewing that organic vitality remains unimpaired, and that nature would cure herself if she was assisted in the least, and had a sufficiency off fluids, to enable her to expel the offending matters from the intestinal canal.

The foregoing naturally leads to allusion to an other remedy to which I shall at present refer as being interesting to the general reader, and capable of universal application through the bounty of Divine Providence.

This which is the simplest of all remedies, yet the most universal, the mildest, yet most efficacious,—the most powerful, yet the most gentle,—the source of [18] light, heat, and motion, and the very support of life itself [19] has been the last, as usual, with the pride and vain glorious sufficiency of man, to be tried as a remedial agent.

How many thousands have been condemned to perish in agony, from the unnatural withholding of that ele-

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they seek the upper portions of the tube, and endeavour to escape at the mouth. In children this is daily witnessed, they are extremely liable it worms, consequently when they are attacked with cholera, it is no uncommon thing to see the worms crawling out of the mouth. That which induces the worms to quit the tube, must be also hurtful to the mucous membrane; and here therefore behold again the truth of the natural doctrine displayed and the consequent natural system of cure: simple inflammation would never cause these worms to quit the tube, because they themselves exist in the midst, often, of inflammation and mortification of their own making.

[18] "Philosophers say that to understand the accidents of oxygen and its antagonist hydrogen and their intermediate grades of atoms is to understand the general mechanism of atoms and of nature."

[19] In the oxygen, hydrogen, nitrogen, and carbon.

ment destined by heaven to be the allayer of thirst and the supporter of life![20]

What a libel on Omnipotence is this!

Thanks however to the reviver of the remedy; he has conferred a lasting benefit on the human race; while he has confirmed the soundness of the older writings, compared with which, this circumstance has now proved modern scribbling to contain much chaff and little of sound doctrine.

The remedy in question is WATER, the reviver of its employment is Dr. Hardwike Shoete. This was the way Sydenham of England cured cholera two hundred years ago nearly: and many centuries before him, in fact from the remotest times, the way of the Arabians, the Persians, and the Indians, and every nation that had any faith in natural theology.

But the present generation knowing nothing of this, gazed in astonishment when the epidemic re-appeared, and after some hundreds of thousands had been swept away, at last fixed upon the simplest and most universally distributed substance in nature for its cure; and one too which had been used centuries before in Europe, and in other countries from the remotest ages.

These are the fruits of the march of intellect! death in every dwelling! desolation in every abode!

And so will it always be while we neglect the writers that have preceded us; for epidemics return periodically, and without a guide or director, what else save death must follow.

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[20] If there is any symptom more dreadful than another it is the thirst; constant in every instance; strange it is that the natural allayer should never have been given.

There, for instance, are the "*sweating sickness*" and the "*black death*,"[21] who, from his *own* knowledge can tell what these diseases were, or are, or are to be, and yet, for aught we know, they may be ripe again, and ready to sweep round the globe.

And there will be the same wondering for twenty years, the same speculations, controversies, and disputes, and the same fearful mortality that has in these days characterized the progress of cholera, till at last the treatment will settle down into the same natural simplicity that now in our time has at the eleventh hour been had recourse to in the reigning epidemic, with such unexampled success that all who have tried it have found it efficent.[22]

This practice, unrefined as might be expected, is the rude and modern application of the ancient treatment by the exhibition of fluids, prepared in various ways to increase their efficiency, and which was often such as to restore life after the pulse was gone.

And now again in England, after the lapse of centuries, the same success has attended the exhibition of liquids in the worst cases of collapse. And in this conntry the practice has been at last adopted, and never again it is to be hoped relinquished while the epidemic exists.

The happy effects of its exhibition are no less universally manifest than the existence of the fluid itself. And although at certain seasons and in certain localities it may be during the reigning of the epidemic constitution pregnant with impurities, yet from these, it can be readily freed by means, as universally at disposal as the fluid itself, and which are themselves indicated in the cure. Its occasional impurity and the effects resulting from it in that condition have been brought forward as arguments against its use; as well might we bring forward sour wine and the grapes as arguments against the use of good wine.

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[21] Praiseworthy investigations have been lately made into the nature o "black death" but I believe the learned writer is not satisfied in his own mind regarding the real nature of the disease.

[22] See section cholera, treatment.

In unhealthy situations, and especially during the prevalence of a severe epidemic, the water abounds with animalculæ, it assumes in consequence a dirty colour, often mistaken for earthy impurities.[23] The naked eye discovers them in millions, a common microscope in tens of millions.

Not only in the water do these exist, but in the mist that overhangs it in the hollows, and in the dew deposited in the vicinity.

Their existence in these situations, in inconceivable abundance, would seem to demonstrate the absence of carbonic acid gas: and the specific gravity of the other gaseous compounds also supposed by some to be the cause of epidemics, would (in addition to their known effect on animal life) preclude the possibility of their resting in such situations.

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[23] The impurities suspended are readily precipitated by alum, or by the seed called nirmulli rubbed on the internal surface of the vessel for the reception of the water. The Hindee name of this seed is chil binge ka phull, and the botanical name strychnos Potatorum. When impurities held in suspension are precipitated, the animalculæ can then be distinctly perceived in lively agitation; on the addition of a little lime juice or tamarind juice and Carbonate of soda, and then agitating the vessel, these swarms will be seen to fall in lifeless showers to the bottom,

Their absence from spring, and especially mineral waters depends also upon the presence of fixed air.

And, in the abundance of the samein the blood, and its constant evolution from the lungs, and presence in the air passages, the beauty of design appears wonderfully displayed. Sleeping or waking this poison is evolved and watches everlasting the avenue of life.[24]

(Singular however it should happen that the period of epidemic invasion should be that when the minimum is evolved and the mist or damp charged with excessive abundance.[25])

The same principle applied to the destruction of the animalculæ in water is instantly efficacious;[26] the living cloud sinks in a lifeless shower, and a clear and wholesome beverage remains.

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[24] The presence of carbonic acid gas in the air passages constantly preserves us from being suffocated by the swarms of insects, and animalculæ that abound in the air, they cannot exist in the breath, consequently cannot maintain their ground, otherwise they would fix themselves, and produce instant death, by the induction of spasm: but when the gas stupifies them, they are easily thrown out by the next expiration. The effect of the breath on insects is easily seen by inclosing some in a glass tube (open at both ends) and expiring through the same. The presence of carbonic acid in the venous blood would appear to be especially intended as a poison to animalculæ, precluding the possibility of their existence therein.'

[25] The severest attacks of epidemic cholera take place in the night or between midnight and morning,—the period when the quantity of carbonic acid and oxygen passing out from and into the blood is at the minimum, and when the abundance of animalculæ is in excess; those which have been dried up during the day, start again into active existence on the deposition of the dew. This can easily be proved by any one, it is merely necessary to evaporate water (abounding with animalculæ) on a glass plate; examination will not discover any on the dry surface, but when moistened they will be seen to start into active life.

[26] And might be advantageously applied to the daily purification of drinking water, and also to the destruction of insects, &c. that infest and destroy plants. The carbonic acid baths in London, so efficacious in the cure of itch, &c., act I conceive upon this principle; the insects are destroyed.

Nor will acids, or alkalies, or wine or spirits effect this, even in such quantities as could not be taken into the stomach with impunity; far less in those which would enable the liquid to be drank in repeated and constant draughts, as required to effect a purpose, or demanded by the urgent thirst. There will nothing answer equal in efficacy to the first mentioned which, besides rendering the liquid a harmless beverage, also affords an added property of grateful freshness which, of itself, is of inestimable advantage. Water! water! water! is the constant never failing cry of young or old, high or low, rich or poor. What a bountiful providence to afford such an easy means of gratifying the pangs of intolerable thirst! means universally procurable in every situation, and as abundant and commandable as the fluid itself.

And these substances too, are themselves particularly indicated in the treatment, from the absence of all the healthy secretions, compounded more or less of the essential elements afforded by the water, alkali, and acid, fixed and common air. Thus we have a medicine of universal application, whose materials are every where procurable; which restores fluidity to the blood; gently carries downwards the irritating contents of the bowels; allays the dreadful pangs of ardent thirst; affords materials for the elaboration of the secretions, is antiacid and powerfully antiseptic, may be taken in any quantity; and *last not least, is eagerly demanded and relished by the sick.* A medicine for a disease prevailing universally must be itself universal, cheap and abundant, eagerly demanded by the sick and wonderfully efficacious; there must be no theory about it, but plain down right matter of fact; there must be no hypothetical withholding unto death, but exhibition, ad libitum, till restoration to life.

With the above the characters of the epidemic correspond. The constant viscid state of the blood as constantly demands a treatment that must be obvious to any one. The irritation in the bowels and the constant passing of altered ill conditioned matters as obviously demand a treatment which will blunt the acrimony of the contents of the intestines, and gently carry them downwards. The bound up secretions as obviously demand the exhibitions of fluids to thin the blood to enable the secretious to be carried on; and the elements carbon, oxygen, hydrogen, and introgen, are as obviously demanded as they are as obviously supplied by the remedy in question.

That most important of the animal fluids the bile, of which no animal is destitute from the highest to the lowest in the scale, and which in the bitter constitutes the preserving principle of the vegetable world, (from which man himself is obliged to borrow a portion for the cure of his diseases,) this bile, I say, so essential to life, is altogether absent in cholera; no case of real cholera has ever yet occurred where this has continued to flow; and how can it be expected to flow? when the blood is so thick and tarry that when a vein is opened it will not flow. Till this blood is thinned therefore there can be no bile; and of all remedies what can be better calculated to restore fluidity to the blood than the one I have pointed out, with all its recommendations, and eagerly desired by the sick. Behold the treatment of the present day! calomel and various other powders and nostrums! these cannot thin the blood, therefore the treatment is empirical in the strictest sense of the word. The exhibition of calomel or other solids is just as inefficacious and injurious as the treatment of the spasms by the application of hot sinapisms and blisters, &c., to the extremities.

The system therefore which of all must tend soonest to the restoration of the secretion in question, must be the best. Such is the all important part this secretion acts in the due regulation of all the functions of life, that Divine Providence has made ample provision against its occasional deficiency, absence, or disease by a liberal bestowal of a corresponding principle throughout the vegetable world. To this principle in some form or other every nation seems by instinct to attach some divine and unknown property and to adhere with fond attachment to its constant use. The hop in England, gentian in Switzerland, opium in India, tea in China, and coffee and tobacco all over the world are a few of the most prominent examples that occur to me at the moment.[27]

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[27] It is much the fashion to condemn without a hearing the use of tobacco in every shape and not only tobacco, but every article which comes into general use and contributes to the comfort as well as the health of the great body of the people. The whole argument is a tissue of inconsistency resulting from complete ignorance of the principle of life in the animal and vegetable world. The arguers and judges in question while they deny a quid of tobacco or a pipe to the hard working soldier or sailor, will think nothing themselves of discussing a few bottles of beer, or port.

In reference to the present subject an interesting communication has lately been recorded this month, in the India Journal of Medical Science, as follows.

" It should be mentioned with reference to the prevalence of scurvy on board the Exmouth, that, at the end of the second week after sailing, the

And more wonderful than all these is the singular circumstance of the adoption by the great nation of the holy bitter of the Chinese, from whom thirty millions of pounds are annually purchased for the use of the inhabitants of the British Islands, who, instead of esteeming it only as a luxury, and paying sixty shillings the pound as in 1660, now consider it, and justly too, as one of the essential necessaries of life.[28] What a beneficent providence to have directed the pursuits of life to the discovery of this invaluable plant instead of leaving them to the chance of having fixed on others the bane of their respective countries!

The principle in question, however, is universally diffused; even in the snows of Lapland, or throughout the frigid zone, the Iceland moss, *bitter* and nutritious, forms the chief support of both man and beast.

In every country in the world, in fact, hot or cold, moist or dry, elevated or low, unhealthy or salubrious it is the same, and there the ever bountiful hand of all-seeing providence is ever stretched out ready to relieve his

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stock of tobacco, which the men brought with them, became expended, and with the exception of a small quantity procured from the Steward, the men were without it till reaching the Car-Nicober islands. *Had there been a supply on board the men might not have suffered as they did;* so great was the deprivation felt, that as a substitute the men would *squeeze the hop found floating in the porter casks,* dry them, and then put them into their pipes to smoke.

[28] Tea is gently stimulating; does not induce drowsiness or lethargy, and enables the body to undergo excessive and continued exertions. In sedentary habits it may induce nervous sensations, but where there is exercise and exertion it does not. Where exertion is demanded during the night, tea enables it, to be performed without fatigue or lethargy; beer, wine, or spirits on the other hand, are followed by drowsiness and inactivity.

suffering creatures! but they refuse the proffered aid; they see no proofs of design spread out before them on the wide and beautiful map of natural theology; the trees that crown the mountain's rocky* brow, afford to them no clew to the principle of life and the cure of disease; they can see no resemblance between the principle of life in the animal and vegetable worlds; but confident of wisdom, they condemn this principle of life, fabricate new ones of their own, and sink with them to the grave, a smoking mas sof mineral poison.[29]

If natural theology will not teach, what else will; what will it serve to point to the husbandman who knows too well his flocks will perish if he feeds them long on an aliment destitute of the principle in question? What will it serve to point to hybernating animals that exist for months, and often for years together (nay, for centuries), preserved from death by the principle in question? What serves the example of every living thing from man to the bottom of the scale; or to the vegetable kingdom where the hardiest and most durable present it in an eminent degree. This the principle of existence, the prolonger of life,[30] the purifier of the blood, and the resister of putrefaction is attacked and abused with merciless remorse.

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* Observe, "rocky"—the loftiest trees frequently clinging to the bare rock, here again the principle of life displayed;—it has been a guide throughout the text.

[29] Nothing better illustrates this than the attempts to cure the most common of all the forms of the epidemic by mercury, many have I seen in the prime of life, with the sockets of their teeth destroyed, their teeth like shaking quills upon the fretful porcupine, or the roofs of their mouths drilled like a honey comb, from the effects of mercury, and yet still suffering from attacks of ague.

In the numerous forms of the epidemic prevailing in every country in the world, constituting three-fourths of the diseases which attack men and animals, *this principle is deficient;* yet, while the latter seek a cure in the bitter vegetables that abound, man must needs pursue an opposite course and drain the system of every remaining drop : thus follow apace diarrhœas, dysenteries, and dropsies, and a thousand forms of cahexies, the result of diminished vitality.

Comparative anatomy, as well as human pathology, display the important nature of the hepatic system, in the first instance, in the immediate connection and association of the system in question, with the digestive apparatus,[32] in the second, in the instructive fact that, when in man, the secretion is prevented by obstructions from flowing into the bowels, then the wise provision of nature allows of its passing direct through the system to exert its specific action. This interesting point I have endeavoured to illustrate in various parts of the following pages.[33]

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[30] Every circumstance which can throw light upon the important secretion in question, as influencing the nature and treatment of the epidemic, must be interesting, as tending to the conception of clear and distinct views, which being founded on truth cannot be shaken; and I will therefore here draw the reader's attention to the case of that singular individual at Jusselmeer, (related by "Lt. Boileau" in "his personal tour)" who allows himself to be buried above. This individual is solely enabled to survive the task through the integrity of the secretion in question continuing from first to last. He prepares himself b y living, beforehand, on milk, which is a substance that affords the greatest quantity of nourishment, nearly of any; so that every particle is of use to the system, and none, therefore, requires to be passed off by sensible processes.

When, therefore, he has lived on this a certain time, so that no useless materials remain in his stomach and bowels, he gradually leaves it off, and

In cholera the absence of this secretion, also, (although the result of a different cause) conduces to speedy death, and the object to be kept in view is its quick restoration, by affording that fluid which nature herself invariably has recourse to in all her operations whether animal, *vegetable, or* mineral.[31]

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the system as gradually acquires a habit of living, as it were, upon itself; when this is acquired, the individual is ready to enter into the torpid state, which feeling approaching, he indicates the same, and is immured in the tomb.

The excretions are apparently nothing, because there is nothing to excreate; but the secretion of bile is constantly going on, and as constantly absorbed, and again secreted.

This is the principle by which the internal vegetable is kept alive, (an animal being nothing more than a plant with the roots turned inwards. For the reader will recollect that in animals, there is an internal circulation, quite distinct from that of the heart and arteries, this last being only necessary as the external organs become more and more developed in ascending the scale, and it is the former circulation which keeps going on in animals in a state of torpidity, as also in the above instances mentioned by Lieut. Boileau, where the individual's limbs were stiff and rigid, and himself in a manner dead to all external impressions. But these external organs, being superadded, are not to be confounded with the internal circulation I have described as continuing to support life, and which is part of the same that in sleep restores, and revives the system by conveying nourishment into the general circulation.

This individual, therefore, exactly imitates the torpidity of animals, and, from observing them, he has probably borrowed the idea. He has said, that they might hurry him for a year; and, that he might last under certain circumstances, I see no impossibility.

The object, however, to which I wished to direct the attention in quoting this case, is the importance of the secretion in question.

[31] The liver suffers like other organs from the stagnation of the thick blood in its minute structure, consequently even after fluidity has been restored to the blood generally, and the circulation again set a going,

The types of the epidemic, which it is the especial object of the following pages to illustrate, are cholera, ague, and dysentery, which continually and universally pervade the world, varying in severity and frequency according to season and salubrious locality; these will ever be found associated together in the jungles and swamps, inlets and bays, filthy hovels, and crowded badly regulated cities of every country: prevailing together, or intermixing, or disappearing in the same order of succession.

The innumerable varieties which spring from these original types, though presenting ever changing features, according as they incline to one or to the other, or in proportion as secondary topical affections become ingrafted on the first, can still all be easily traced to their original source; and all require respectively the application of the same general principles of treatment.

The consideration of these would serve no useful general purpose, because they would severally illustrate individual examples, not the specific character of the epidemic.

And when the epidemic moves from its usual haunts to perambulate the earth, we see its course preceded by fevers, dysenteries, and diarrhœas, marking its approach;

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diarhœa or dysentery are as common sequelœ as they are common premonetory symptoms. The sooner the blood is restored to fluidity the less is the damage sustained by the various organs; all attempts therefore to cure the disease by substances which are of a less fluid nature than the blood itself must only add to the damage sustained by the different organs. Who would ever think of rendering treacle fluid by the addition of colomel or other powders? yet the blood in cholera is like treacle or tar, and still calomel &c. is recommended by many as the only cure. From these few observations the general reader may be enabled to draw his own conclusions.

as we likewise see it decline again into these affections. Hence in Russia Dr. Russell says that the fever attending it could not be distinguished from the ordinary continued form, and that it propagated itself by contagion; those affected being attacked, not with the fever of the cholera of the patient from whom they caught it, but with a true blue cholera.

This cholera and fever are stages of the same epidemic, at certain seasons one predominant, at other seasons the other, according to the intensity and activity of the epidemic constitution, which is at once pointed out to us by the condition of the blood. When there is the severest collapse it is at its greatest viscidity, it cannot flow

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[32] See Dr. Grant's lectures on Comparative Anatomy.

[33] But of all proofs the most convincing of the truth of the natural doctrine endeavoured to be pointed out, behold it in the habits of Europeans not only throughout Europe but throughout the burning plains of India. In opposition to all that has been written, and all the laboured theories of sympathy between the liver and skin, the consequent abundance of bile and its pernicious effects, I say in opposition to all this we see nature maintaining her right, and instead of taking away from the system actually adding thereto a profusion of the bitter principle.

The greater the fatigue and exertion, the greater the exposure to the burning vertical sun, the greater I say this natural fever of the body, the greater the demand for a liberal supply of the principle in question, and accordingly do we see it afforded with unsparing hand.

It is no gaudy theory, no laboured hypothesis, that thus practically points out the egregious errors of the refined doctrines of the modern school, but it was and is the plain and simple fact of the universal consumption of the principle in question; the cultivation, manufacture, exportation of which supports at this moment many hundreds of thousands of individuals.

through the pulmonary tissue, it is collected consequently on the right side of the heart as far as the skin, and giving that blue appearance.

But when fluidity is restored it begins to pass through the lungs, flows to the surface, swells out the skin, and constitutes fever.

These are two of the three forms, the third is dysentery.

In this the bowels become ulcerated from the diseased secretions, and the continued irritation modifies but changes not the characteristic marks of the epidemic, for it often exists in all the forms.

It is only a more protracted form and more obstinate, often intermittent, alternating with fever,—and frequently contagious[34] (like cholera) when this is the case.

These few foregoing remarks point more particularly to the symptoms evidently resulting from the thickened state of the blood in the severe form of the epidemic, where there is a stoppage of every secretion, contraction of the features, collapse, and death.

Frequently however a disease of a very different character is engrafted or superadded and has occasioned the epidemic to be called cholera spasmodica, which is a misnomer, these being often absent in the worst cases, hence not a spasmodic disease.

The little attention that has been given to these symptoms, in order to discover if they werea part of the epidemic in reality, or only dependant on circumstances, has occasioned an erroneous system of treatment for their relief, contrary both to the real nature of the disease in particular, and the distribution of the nerves in general. It has occasioned the application of blisters, sinapisms, scalding water, hot sand and bricks, and frictions to the extremities, invariably, while the disease, the cause of these spasms, and seated in the nervous columns is in the region of the stomach or bowels as the case may be. Perceiving this, when I had the spasms in cholera which were in my legs, requiring people to hold them, I had hot fomentations applied to the abdomen and loins, of the side affected, and the relief to the spasms in the legs was speedy and effectual. When the spasms attacked the other leg, according as the bowels were moved and griped, I did the same to that side with an equal good result.[35]

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[34] See article Contagion.

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[35] I should state that I have had cholera three times; the last time about a year ago the worst, the spasms being severest; and it was only in this third attack that I formed in my mind any rational or satisfactory explanation of the disease, and particularly of the spasms. It is no wonder therefore that so little progress has been made in a correct knowledge of the origin, progress, and termination of these spasms, when it required, or rather when it was not till after three attacks in my own person that I felt I knew any thing about them. My first attack was at Arcot in 1830 where I was attended by Dr. McKanley, member of the Medical Board, Madras; my other two attacks were in the northern division last year (after the Goomsoor campaign) when I was attended by Mr. apothecary Francke and first dresser Muniapen. I have referred in the sequel to the natural system of cure which was adopted, not from theory, but from an instinctive desire to relieve the most distressing symptom, the urgent thirst, which seemed to stop my very breathing, as it actually was doing, not by itself alone but by the blood being too thick to flow through the middle passage, one of the principal links in the chain of morbid actions in cholera. This I did not know at the time; but this I do know, that each draught I took (in rapid succession) seemed as if it was diffused in rays over the chest imparting new life and buoyancy to the oppressed breathing.

The foregoing, therefore, has reference to the process by which I propose to illustrate the nature of these spasms, the advantage of knowing how to relieve them, and the importance of the study of the nervous system as showing the reason why frictions and blisters, and hot applications will not relieve them.

Even amputation itself would not do it; hence the reason why in nervous irritation, after amputations, the individuals frequently experience pains, as, if in the part that has been long removed, to which, in the case of its being present, as in cholera, stimulating frictions, &c. would be assiduously applied; they are productive of injurious consequences, first by harassing the patient, and second, by sending the thickened blood more to the centre of the body, about the heart and lungs, which become more oppressed.

Nothing better points out the nature of cholera than the nervous affections presented to view, varying in every case, and, in the same case changing, every few minutes from one place to another, according to the internal organs or portion of bowels affected.

And these spasms are prognostics of the gathering of internal disease.

While existing occasionally in the lower extremities, changing from right to left, and followed by evacua-

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This sensation of relief is owing to the fluid passing through the tissues, mixing with the blood and enabling it to pass through the middle passage, exactly on the same principle that we add water to thick fluid to make it strain more easily.

[36] See Flourens Rolando Bellingeri, Walker, Tiedeman, Bell, Mayo, Magendie, Shaw, Solly, &c.

tions, they are not wholly unfavourable symptoms ; those in the upper extremities are, whether they are violent or not, as they point out the stomach and contiguous portions of intestine to be materially involved or injured ; as well as that abdominal spasms shows irritation to exist in the small intestines ; whereas, the disease being seated lower down, or when the matters are going off by stool, there are spasms in the inferior extremities, and more particularly in the left, after or during each evacuation.

When the evacuations are scanty however, or have been suddenly checked, the bowels become distended, and the spasms become universal ; the abnormal influence is propagated along the sensitive columns, and involuntary contractions are produced in the muscular system. The primary influence is perceptible and distinct while the secondary production of spasms is almost immediate. Hence the higher the disease is situated the greater the danger, for the corresponding spasms will be in the muscles of the respiratory system. While lower down in the tube the accompanying contractions of the muscles of the extremities will, in other instances, be equally painful and severe as those of the chest, but not bring in vital organs they are not fatal.

The premonitory nervous sensations, so universally complained of especially in Europe, during the prevalence of the epidemic, were of the same description, and arising from a similar cause, but only partially developed, and often accompanied with diarrhœa, or derangement of the bowels which was called the premonitory diarrhœa, often running into cholera, with a proportionate development *of spasms, when the discharges* *were not free, or when they lodged in the tube; giving the false appearance of cholera without evacuations.*

Notwithstanding the light that has been of late years thrown upon the physiology of the nervous system, the principles indicated in the treatment of disease do not appear to be adopted in that of the epidemic now under consideration, more especially in the spasmodic variety, for the relief of which, as I have stated, remedies are applied to the wrong parts, and much pain and torture unnecessarily caused.

There are no remedies that have yet been exhibited in the treatment of cholera, the ratio operandi, or principle of action of which I can at all clearly understand, save and except diluents, and these, of all others, have been the most successful; and the direct effect of these is evident to the senses, and illustrated by the functions of the system; while, with the others, all is doubt and obscurity, save those (as venesection) which relieve superadded symptoms.

In the first place they mechanically assist in clearing out the stomach and bowels, and thus removing the cause of spasm. In the second they penetrate the tissues of the system, and thinning the blood restore the circulation.

The principle in question, (endosmose) which here also acts in the cure of cholera, should be appreciated with intense interest by the general reader, and which he will understand from the following.

When a membrane is viewed under the highest powers of the microscope, it appears to possess a perfectly homogenous texture, without pores of any kind; and yet water, milk, and other fluids, placed under certain circumstances, are capable of passing through it with considerable facility. If for instance, a bladder containing treacle (which may here be taken for the blood which is always described a like treacle or tar in cholera), be placed in water, a portion of the treacle will soon be found to have exuded, whilst a still larger quantity of water will have penetrated into the bladder; and this action will continue till the fluids have acquired the same density, and the bladder becomes distended. In this way it may be shown, that a syrup three times the density of water, produces an endosmose capable of sustaining a pressure equal to the weight of three atmospheres.[37]

If a vessel containing an acid solution, secured at bottom with bladder is immersed in another vessel of water, the latter will, pass into the former, the surface of which will be raised above the level of the water.

If water is placed over a column of mercury with an intervening membrane, the mercury will descend, the middle space becoming filled with gaseous vapour. On removing the superincumbent water, the aqueous vapour leaves the surface of the mercury which again rises to its former level.

If a vessel of alcohol, secured by bladder, be immersed under mercury, at the end of a week will be found to have diminished in quantity, and the membrane to be concave.

It was found the same with gaseous fluids.

The lungs of animals secured and immersed in carbonic acid gas will eventually burst.[38]

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[37] Henslows Botany, Lardners cyclopœdia.

[38] Mitchel.

From the foregoing brief allusions to the principle in question the reader will be enabled to appreciate the great importance of attending to it in the treatment of disease; nay, even in the restoration to life from apparent death, he will perceive the agency of this law.

In the subsequent pages he will find mention made of hopeless cases of cholera recovering on free exposure to the atmosphere; these cases, and all others, are solely restored to health by the powerful and active influence of this law which is constantly in operation. Nature thus restores to life in hopeless cases after man has expended all his ingenuity in endeavouring to relieve upon principles directly the reverse; that is, while man endeavours in vain to cure cholera by withholding liquids, and excluding the influence of the atmosphere, nature, on the other hand, causes the atmospheric gases and aqueous vapour to permeate the tissues, enter the blood, and set the circulation again in motion.

I cannot suppose for a moment that those who *proscribe* fluids in cholera can be acquainted with this law; and it is probable that they imagine them to lie in the stomach. What though they even do lie in the stomach, naught but advantage will result: the vomiting will be rendered easier, and the danger will be less of the fit each time terminating in spastic rigidity of the voluntary muscles. Those however, who thus condemn fluids, act with singular inconsistency in other matters, of a similar nature. They, for instance, in giving an aperient will give directions to drink freely of diluents, such as tea, or whey, gruel, or congee, &c. for the purpose of working off the physic. In a small matter of this kind are such weighty directions given by those who will see thousands perish in the epidemic, begging and praying, in their last dying words, for a drop of water to cool their burning tongue.

I cannot discern the reasoning by which such a course has been recommended, in opposition, as it is, to every law of the animal economy.

If, in an artificial cholera, it is considered necessary to assist the operation of drugs, how much more imperious must the necessity be of assisting nature upon the same principle in the epidemic, instead of allowing her to expend her own juices for the same purpose, till at last the viscid nature of the remainder precludes the possibility of its circulating through the pulmonary tissue and it accumulates in the venous system, constituting true blue cholera? Blind to the universal existence of this principle of life, as I was myself, fluids are condemned by the majority, and friction, and shampooing recommended for the cure of spasmodic cholera. Let me illustrate the pernicious tendency of this whole system by a simple reference to a tube of leather with succession of elastic valves of the same material ranged along it in side.

Now, suppose the tube to be half full of treacle, too thick to flow through small holes at the end, pressure would never cause it to flow, and the treacle would accumulate and distend one end of the tube, being prevented from returning by the valves? So,in cholera,the great pressure from the friction and shampooing forces on the tary blood towards the heart and lungs, where it accumulates, being unable to get either one way or the other, but occasioning spasmodic suffocation, especially when combined with irritation of the alimentary expansions of the pneumogastric and sympathetic systems of nerves. My reason for referring to this combination is, that asphyxia often continues for hours and yet the patient recovers.

There may be some passages in the foregoing which may appear ambiguous and difficult to comprehend; but the difficulty will disappear as the reader continues to peruse the succeeding pages.

It is to be expected that, difficulties will occur whilst endeavouring to trace the connecting links between cholera and ague, diseases so long considered apart from each other, as being widely different, and depending on distinct and separate causes. The difficulty however will vanish, after careful reflection, and when surveying them as different stages of the same epidemic. These stages do not occur always with the same intensity; sometimes one is developed in an excessive degree, sometimes another, and hence are presented the diversified types that occur. In the next sections I have illustrated the progress of diseased action by a comparison with the natural actions of the system as they are presented daily to our observation. These last constitute the frame work of the epidemic, which, by being well considered, illustrates the constitution of the different stages of the latter. I have frequently seen the accession of ague put on so many symptoms resembling cholera, that it would have been with difficulty recognised, had the natural view of the stages of the epidemic not enabled me to perceive, through the apparent obscurity, the development of particular symptoms.

It is a happy confirmation of the correctness of the view here taken of the epidemic, that, whilst it was, eleven years ago, deduced from experience in the treatment of the different forms, the subsequent observations of others on the blood in cholera and fever lead also now to the same conclusions. In the valuable paper of Dr. W. B. O'Shaughnessy on the Chemical pathology of the blood in cholera, the deficiency of saline ingredients is pointed out; and Dr. Stevens has remarked in fever, a deficiency of the same, corresponding to the severity of symptoms. Thus, whilst I have considered cholera and ague different stages of the same epidemic, from having observed the development of their connecting symptoms; in the separate consideration of others of their chemical pathology, the view that has been taken is confirmed.

By the last alone however, I could not have traced the connection between the different stages of the epidemic; but these subsequent coincidences, here pointed out, add value to the view that has been taken, while they are of extreme importance in reference to the treatment of the respective diseases. The reader therefore will bear this in mind in perusing the following pages, in which it will be attempted to trace the rise and progress of the epidemic, through its different stages, according to the order in which these have presented themselves.

The principles adopted in the cure, were pursued from the knowledge imparted by the consideration of the features of the epidemic as evident, perceptible, and invariably present, and not founded on the statements of others which might hereafter prove fallacious.

Among some of the most prominent of those circumstances, which I have taken as a guide to steer by, is the important one to which I did, and will hereafter particularly allude, viz. the absence of the biliary secretion.

No fatal case of cholera has ever occurred to my knowledge, where this secretion has been continued to be passed by stool.

Another important feature, and one of the leading guides, is the absence of all fœcal matter in the alimentary tube, in fact, an absence of all assimilated matters, a condition quite opposite to that in health, when the colon is constantly filled with a mass of highly alkaline matter, and the small intestines continually lubricated with the biliary secretion possessing a similar character.

Observing these circumstances, therefore, the term "alkaline diathesis" in reference to health, and hence pointing out an opposite condition, *or tendency thereto in cholera,* will not be misapplied. It does not follow, that all traces of alkali will be absent in cholera; nor is it meant that such should be implied; it is merely intended to point out the very different condition between the alkaline condition of the primæ viæ in health, and in the collapse of the epidemic.

The liver is set to guard the entrance to the alimentary canal, and in proportion to the abundance and healthy condition of the bile, so is the freedom from diarrhœa; and the scybala present a strong alkaline re-action: on the other hand in proportion to the deficiency of the alkaline secretion so is the tendency to irritation of the mucous membrane, and discharges from the bowels.

Perceiving corresponding circumstance to these therefore as invariable attendants on the epidemic, it is impossible to refuse their admission, in preference to others of doubtful stability, to be regarded as guides in the consideration of the symptoms. It matters not whether they are the first or the last in the chain of cause and effect, they are still equally important, seeing that their condition has a constant and inseparable respective relation to termination in health on the one hand, or in death on the other.

In the subsequent sections the chain of connection I have endeavoured to trace, whether as leading to full development in the first place, or as arising from it in the subsequent stages in the second.

To cholera, dysentery, and ague, and all their varieties, these remarks are equally applicable.

Thus the different stages of the epidemic will be illustrated at one and the same time, a circumstance of much importance, in fact so much so, that it alone has enabled me to consider the subject in the manner that I have done, within limits which would even be considered insufficient for the separate consideration of either cholera, dysentery, diarrhœa, or ague.

There is a point which has caused considerable difference of opinion regarding cholera, and, to which I will here advert, viz. the thickness of the blood existing in those cases where the evacuations from the bowels have been inconsiderable. Now the doubts upon this subject have arisen from not connecting cause and effect; I have just pointed out the abundance of the biliary secretion in health; in this condition excessive discharges (by artificial means) may take place from the bowels with impunity, but the moment the secretion is stopt, the system immediately sinks under the continuance of purging. The power of assimilation has been lost for some time previous to the accession of symptoms; hence substances that have been swallowed even a considerable time before hand, are ejected in an indigested state, and the blood is thus minus the daily supply of nourishment necessary for its circulation through the capillaries. In weakly individuals, therefore, it so happens that a few stools are in this condition sufficient to cause death; while in other cases it has been said that death took place without any evacuation from the bowels at all. These circumstances do not, in the least, affect the general character of the epidemic, because it is clear the evacuations depend upon the quality and quantity of the aliment that has been previously taken, as well as upon the length that it travels down the tube. A large meal of rice, tire, and whey, travelling along the tube, will produce much larger evacuations from the bowels, than a meal of prawns retained in the upper portions of the tube. Yet the loss the blood sustains will be greater in the latter instance, by reason of the profuse and clammy perspirations forced from it at each successive fit of vomiting and spasms. Hence, to a superficial observer, the case where the purging was the freest, would be considered the most dangerous, whereas it is quite the reverse.

When a case occurs without purging (which must be extremely rare, indeed, if it ever does occur,)[39] there will have been considerable vomiting, and the remaining matters have not been in quantity large enough to force their way along the tube.

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[39] In cases where the bowels have been open previous to the attack, and where there has been little or no aliment taken, the purging will not be the prominent symptom. On the contrary where the bowels have been costive, and much aliment taken before the attack, then the purging will be the prominent symptom. Hence the reader will perceive the importance of considering, particularly, these circumstances in connection with every case

They are productive of irritation and inflammation, and thus their very retention causes more harm then their expulsion. Therefore it is quite clear, that such cases should rather be brought forward in support of, than against the general argument. This is all I consider necessary to say on this subject in this place; it is frequently referred to in the sequel.

From the foregoing exposition, therefore, the reader will have already perceived the character of the epidemic, and, estimated the nature of those principles of cure that must prove best calculated to disarm the violence of its attack; and there will therefore less require to be said in the sequel, while considering the rise, progress, and terminations of the epidemic in all its stages.

From the few foregoing observations the reader will have begun to perceive the conformation of the epidemic tree, that the roots of this tree are represented by the venous expansions; the stem, branches, and leaves by the remaining portion of the circle.

He will perceive that, in the roots of the epidemic tree, the venous diathesis is developed, that there is complete distension and blueness of the external covering; he will perceive that, from the viscid and tary nature of the blood, that (as it cannot pass from the roots on to the branches) it

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of cholera, as explaining the ptoms (*no matter how diversified*) when the disease is fully developed. The oversight of not regarding them has given rise to the supposition that cholera can be developed whilst the primæ viæ contains their usual contents of healthy fœcal matter.

must of necessity accumulate more and more in the roots of this tree, and that at last the pressure to which it is subjected must force a clammy moisture from every part, external as well as internal; he will perceive that while the circulation is stopt that there can be no digestion of the aliment, that it consequently must undergo changes productive of irritation and unnatural contractions.

He will perceive that death must speedily supervene if the blood is not enabled to flow through the stem into the branches. This is epidemic cholera in the fulness of its development. The blood is thick, it cannot flow through the middle passage, and the circulation stops. This is the principal difference between epidemic and sporadic cholera.

According, then, to the difficulty, the blood experiences in passing from the roots to the branches of the epidemic tree, so is the intensity of cholera, and according to the unavoidable irritation established on the internal expansions of the venous tree, so is the severity of all the forms of intestinal discharge, attendant on this venous diathesis.

Whilst any of these continue, the arterial or febrile diathesis cannot, of necessity prevail, but when the blood is enabled to traverse the middle passage, then do we perceive the development of the epidemic in the stem and branches of the tree, we perceive the irritation (often extreme) produced throughout the whole arterial expansion, particularly at first in the middle passage, and then over the surface, with dryness, and heat, and shivering, ending in a profuse perspiration (an ordinary intermittent) or gliding on without perspiration into the severest type of typhoid remittent :—This is the febrile or arterial diathesis in opposition to the choleroid or venous. All the forms and varieties of the one of necessity join and intermingle with those of the other: they are all parts of the same circulation, therefore they cannot be separated either in reality, or in the imagination.

SECTION I.

CHOLERA AND AGUE;

THEIR CONSANGUINITY.

The history of the epidemic, as it has occurred in different quarters of the globe since the year 1817, has represented it as prevailing under a diversity of forms, modified by the season of the year, the general salubrity of climate, the character of the inhabitants, and the modes of treatment employed in its cure.

In Russia for example, it was often the first symptom of continued fever, which Dr. Russell informs us could not be distinguished from the ordinary cases of that disease.

In France, on the other hand, and particularly in Paris, in the districts immediately bordering on the Seine, individuals sank rapidly under its influence in the collapse stage.

Again, in England it was particularly mild, the dense population of London suffering comparatively little; and in other towns, where precautionary measures had been rigorously adopted, (as for instance Cheltenham) the epidemic never made its appearance. While the features of the disease on a large scale have presented these different characters, we find also, on a smaller scale, that they have presented as varied and diversified types.

In India for instance, it has, in some situations, presented a very fatal character, quickly gliding into the stage of collapse. In other localities it has been comparatively mild, insensibly passing into the febrile variety, constituting the common intermittents of the country. In unhealthy countries it has generally shown unusual virulence: and in those localities in India, obnoxious to fever, we find cholera invariably present in an aggravated form during the reigning of the epidemic constitution; while at other times it is ever found more or less to prevail, We find indeed that the different types of the epidemic are constantly associated, and that where one prevails there the other is a never failing attendant. The converse of this is no less equally true, and evident, viz. that those localities exempt from the other different forms of the epidemic, are likewise exempt from the visitation of cholera. As an instance in point may be cited the Neilgherry hills, where epidemic cholera has never prevailed, nor indeed any of the other varieties alluded to. And still further illustrative of the intimate connection of the different forms, is the fact that the solitary instances that have occurred in the above mentioned locality, were in individuals who had been employed in the jungles below, where, it is well known, a short sojourn is sure to be repaid by an attack of fever, or the febrile diathesis of the epidemic constitution, which last, when in excess, displays a corresponding intensity, presenting the development of fever, or the stage of reaction. Hence, in a body of men residing in these localities, will be found many presenting the type of fever, and others on the other hand sinking in the stage of collapse or epidemic cholera.

From the foregoing a useful lesson may be derived in pointing out the certainty of escaping, in a great measure, the influence of the epidemic constitution. For we have here a guide to go by, either when sojourning in any country or place, on in passing through the same. This guide, it is needless almost to remark, consists in the knowledge thus imparted of the necessity in avoiding those places obnoxious to fever, and especially where it prevails during the reigning of the epidemic constitution. For, as certain as the fever does there exist, so certain will cholera sooner or later prevail. Hence a knowledge of this has a two-fold advantage, that while we shun the febrile locality, we are at the same time further removed from the intensity of the epidemic constitution.

Cholera has constantly followed close on the footsteps of fever, and as constantly raged with severity where the latter is endemic. Hence, in every country in the world which it has yet visited, it has shown an invariable attachment to the banks of rivers, bays, inlets, swamps, and morasses, and prevailed with intensity and ferocity among the inhabitants in their immediate vicinity. Its rise in these places has been preceded by febrile epidemics, and the re-appearance of the same has marked its decline.

While at one time the epidemic constitution has been manifested in the universal prevalence of diarrhœa, often terminating in cholera, at another the febrile diathesis has prevailed, and the whole community has passed into the stage of re-action called influenza, in many cases not to be distinguished from the common remittent. This only denotes a more generally diffused yet less intense condition of the epidemic constitution, which, previously in excess, had caused the diarrhœa to run rapidly into collapse without a chance of re-action.

To render the subject more familiar to the comprehension of the general reader, we will draw a comparison between the effects of the epidemic influence, and those produced by a known substance upon the system; such, for instance, as tartar emetic. If, to an individual in health, an excessive dose of this substance is administered, symptoms resembling cholera are induced; the purging and straining, vomiting and retching, continue in an inordinate degree; the irritation of the mucous membrane runs into inflammation, or else the patient sinks exhausted before this last is established. This represents the excess of the active agent of the epidemic constitution.

To a second individual, let a less violent dose be given, and the effects will be of course proportionably milder; there will be the vomiting and purging, or perhaps only the latter, and the griping, and perhaps a few spasms in the lower extremities, and, when all the medicine has passed off, he will experience relief, and fall into a sound sleep from which he will awake perfectly well. This is the second degree.

To a third let a minute quantity be given; he will have no purging;—but there will be uneasiness about the stomach and bowels, they will be distended more or less, and there will be nausea, or even, perhaps, retching. This confusion in the primæ viæ, including the derangement of chylification, does not,as might be supposed, exist long with impunity:—the blood partakes of the deranged condition,through defective chymification and digestion along the whole tube nearly, and febrile symptoms make their appearance:—there is want of appetite, dry skin, listlessness, and languor, &c. This is the third or mild form of the epidemic, or the febrile variety. It does not require a great stretch of the imagination to apply the simile; the only objection is the effect being produced by a substance swallowed; whereas in the epidemic the effect is through the influence of the circulation.

Similar, however, as these effects are, it should be recollected that, when the same substance is administered in miasmatic fever in excessive doses, the resemblance to the choloroid termination is perfect and complete; so much so, that the two cases cannot be distinguished from one another. I recollect many instances of this; the individuals are with difficulty saved. One fatal instance I remember; the patient, in staggering from the necessary, rolled over with his mouth in the dust, and was taken up a corpse. The medicine is a dangerous one in the hands of tyros,* who do not perceive the difference between the buffy coat and miasmatic fevers of unmixed character.

I have mentioned the substance as being given by the mouth for the sake of easy illustration, but the reader knows very well that it produces similar effects when injected into the veins, as shown by Magendie. It will not therefore require a great stretch of imagination to conceive the substance, if diffused through the atmosphere, producing similar effects on the system when inhaled into the lungs.

But as the effect of this substance is not directly upon the blood, but upon the mucous membrane, we must not confound it entirely as being exactly similar in its operation to the active principle of the epidemic constitution which acts directly through the condition of the circulating fluid.

It is easy to imagine a substance possessed of catalytic properties, such as we observe in ferment, or rennet, existing diffused in the atmosphere, inhaled by the lungs, and producing a tendency to a change, or a change more or less complete in the tenuity of the blood, and which degrees of completeness would correspond with the different types of the epidemic, the fluid being thickest, or most ropy and tary in the collapse of cholera, as we see it to be.

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* I mean in the hands of many subordinates, who often fancy that the practice of medicine consists in vomiting and purging their patients as often as they have fever, which is actually aggravated by the practice.

I have adduced yeast and rennet as familiar substances, affecting rapid changes in other bodies; and although milk is widely different from blood, yet the circumstance of the effects of rennet on the former affords credibility to the supposition of some such similar or correlative substance existing, and acting upon the blood, during the epidemic constitution, so as to induce that crassitude invariably present in the collapse of cholera, and more or less so on the accession of all the other types of the epidemic.

Rennet is the juice of the calf's stomach preserved with salt; but the mucous membrane of any other stomach will have a similar effect. In fact, the membranes of animals dried and powdered may be kept for years, and used for the same purpose as rennet.

When this powder is diffused throughout the atmosphere, it will exert its specific influence upon milk, as can be proved readily by reducing it to this condition, during which process it is diffused and produces the effect upon that fluid when placed in the vicinity, or within its influence. And dry yeast may be diffused in a similar manner, and will in this way produce its specific effect of fermentation.

I have referred to these circumstances as being of general interest in connection with the subject in question, as showing the extreme probability of a corresponding active catalytic agent existing in the atmosphere during the prevalence of the epidemic constitution, and producing corresponding changes in the fluids of the system, ending, as we perceive, in fermentation, as seen in the consecutive fever of cholera, and in typhoid remittent.

Arsenic would appear to have the power of destroying this agent, thus tending to the belief of its being a principle of ferment. In the vicinity of the mines in Cornwall, ague is said to be now unknown; which exemption is attributed to the arsenic that escapes from the copper ore during its subjugation to heat, and which is precipitated over the surrounding country. The influence of arsenic likewise in curing ague must depend on the same principle, viz., in destroying the active agent that tends to the establishment of fermentation, or decomposition. I have not heard if cholera prevailed in those situations freed from ague by the influence of arsenic. The excess of the epidemic constitution might have generated a few cases, in such places, both of cholera and ague, but there would be a corresponding exemption from both.

The above fact might lead to the employment of similar means for the destruction of the febrile constitution in unhealthy localities.

The period of invasion of cholera and ague also happens at the very time which would favor the action of any such agent, viz., during the night, when the blood is *comparatively* stagnant, and accumulated in the venous system, at which time the slightest tendency to increased viscidity would develop the symptoms of the disease, from the blood not being able to traverse the pulmonary tissue.

This is the first effect produced, often speedily ending in collapse (by a series of processes which I shall afterwards describe), but also often running into putrid continued fever, so frequently the case in the Russian cholera, and which was the termination of the successive processes of the decomposition of the fluids.

In these cases the blood only partially succeeds in shaking off the diseased tendency, and re-action commences with the semi-depurated fluid; the consequence of the arterial system becoming injected with this diseased blood may be easily imagined, and the difficulty it must experience, and irritation it must cause in passing through the capillaries of the chest, brain, abdomen, in fact of the whole system, are easier conceived than described. This is the febrile diathesis, the treatment of which I have considered under the appropriate head.

As to malaria, miasm, vegeto-animal effluvia, noxious gases, &c. I can say nothing; they are different names for one invisible something, which I think is much better expressed by the term epidemic constitution used long ago by Sydenham; and, till something certain is known regarding the individual properties of this latent body, I can see no advantage in changing the name; much better to call it the principle of ferment, or of septon, or of rennet, or the catalytic principle, or diastase, the substances possessing which are visible and tangible, not a matter of theory like the former ones of malaria, &c. &c.

On the invasion of the epidemic, in any of its forms, among the first symptoms perceived are a paleness of the features and extremities, and a blueness more or less of the same, and the blood, when drawn at this period, is thicker, more viscid, blacker, and less coagulable than natural; indeed it often forms no distinct coagulum, but appears a uniform black mass; it is therefore consistent with common sense to reason after the following manner upon the subject before us, that if such a condition of the blood (more or less complete) is always found to go hand in hand with the development of *all the different forms of the epidemic,* and as it is self-evident, cognizable, and explanatory of almost all the subsequent symptoms, it is more rational to consider it the primum mobile of the consecutive chain, than to attribute it to *invisible agents* without number acting differently in all these instances.

I say if we perceive that a chain of symptoms arise in the second instance from the thickness of the blood precluding it from passing through the lungs to the left side of the body, it is more rational to rest satisfied with this self-evident *mechanical* cause, than to attribute the same to an invisible and inappreciable something.

Many have compared cholera to a nervous disease, but without any reason as far as I am able to judge; in tetanus purgatives are prescribed to open the bowels; in trismus the same; in hydrophobia the bowels are *perfectly* regular, and the appetite is often *intense;* in hysteria, catalepsy, epilepsy, apoplexy, &c. the bowels are all on the constipated side.* Thus, in the whole of these *so called* nervous diseases, the very symptom distinguishing cholera, and causing it to stand horridly aloof from all its competitors, is actually absent.

There is one other circumstance intimately connected with the same subject, and, as it beautifully and instructively illustrates the very different influence upon the circulation as exerted by these two sets of diseases, cholera and nervous affections, I will here allude to it; being desirous to convey all I have observed regarding the character of the disease. The circumstance is *the asphyxiated condition in cholera long before death*, at least, in almost every case recorded, the event has been long preceded by all absence appreciable of the pulse. This being the character presented as a pathognomonic symptom in cholera, it must be a circumstance of extreme interest to know if the condition is the same in nervous diseases, say in that most dreadful of all, hydrophobia. Now, it has so happened that a case, illustrative of this, occurred the other day, and which decides at once the point in question. I allude to the melancholy case of hydrophobia recorded in the India Journal of Medical and Physical Science, for Dec. 1837:—the reader can refer to it, and he will there find the following remark recorded, replete with extreme interest in a physiological point of view. After relating the patient's death, Mr. Brightman states, *the action of the pulse was distinct, and vigorous for at least ten minutes after the pulsation of the heart was entirely imperceptible.*

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* The simple fact, that in the worst cases of collapse spasms are often altogether absent, should suffice to point out the opposite characters of the two affections.

I have already stated that cholera and fever are always to be found together, existing in the same place, and under the same circumstances, while the absence of one of these points out also the immunity of the locality from the other. This would appear more than sufficient to denote their consanguinity; but I will go further in the elucidation by informing the reader, in the next section, that their periods of development and their progress of rise and fall, hold a constant intimate and inseparable relation to one another.

The result of this knowledge (I may here observe) of the consanguinity of ague and cholera unfolds at once the nature of those prophylactic measures which can alone be effectual, and which, in the prevention of cholera, have been the anxious solicitude of all states and nations to become acquainted with. These measures, therefore, it will be immediately perceived, consist in such as will insure the immunity of localities, from the prevalence of ague, for, to the greater or less completeness of these, will the presence of cholera be constantly found to hold a corresponding ratio.

Hence it was observed in many towns in England, where these prophylactic measures were adopted in anticipation of cholera, that not only were they effectual in regard to this last disease, but that fevers, which had been long always endemic in these places, entirely disappeared; the consanguinity of these affections was not taken into consideration because they were not understood; nor could it be expected that this view could be entertained without long and constant opportunities of comparing the different forms of the disease;

I cannot adduce any stronger proof of the consanguinity of cholera and fever than the foregoing.

To recapitulate, therefore, and draw into a sort of focus the tenor and object of these remarks, I will only observe that the severest types of these diseases in an epidemic form generally begin to develope themselves about the same period of the night, cholera in a rapid manner, dysentery less so, and fever gradually rises into the febrile diathesis as the day advances. In the two former, the nervous sensations may be rapidly transferred into features of complete atony, or if irritation increases (by the contents of the tube resting) they will present the spasms. Hence we perceive, that in the midst of this atony of the muscular system, the very muscles which the patient had not the voluntary power to call into action, are actually thrown into spasms when the irritation increases in any particular part; and as the contents of the tube pass down, these spasms change from the right to the left extremity. Again, when the nervous sensations continue to harass; and when there has been no complete diarrhœa, but a laxity of bowels, or a tendency thereto, and when the venous system is engorged more or less, as seen by the shrunken white, dusky or livid, or blue epidermis, it is merely the same condition in a minor degree; it is the system struggling to rise into the febrile diathesis, which it does sooner or later, as the natural actions begin to be developed towards the commencement of the day.

SECTION II.

CHOLERA AND AGUE;

RESPECTIVE PERIODS OF INVASION.

The nearer we approach to the intimate consideration of the different forms of the epidemic, the more do we find them observing certain fixed laws, individually illustrating each other; as well as that the principal features of all hold a strict relation to those natural actions of the system which are daily and hourly presented to view.

As the day slowly dawns, so the functions of the system become slowly developed, following, with regular progress, the distributor of light and heat; when these last are at their height, so also are the actions of the system; and as the former decrease, so also the intensity of the latter declines.

This is the natural fever of life, daily returning with its regular stages, through the lengthened term of three score years and ten.

These natural actions of the system influence disease, and cause it to obey corresponding periods of rise and fall. Hence the fever of disease rises with the natural fever of the day; and when the system has settled down in rest and quiet, in the dead hours of the night, the fell destroyer cholera stalks abroad.

This general allusion to the periods of the respective invasion of these two types is sufficient at present for every useful purpose in directing the attention to the reciprocal and mutual determination of healthy and diseased action.

All the varieties of the one type take place during the night; all those of the other, during the day.

To the former belong all the forms of epidemic cholera, dysentery, and diarrhœa; to the latter, all those of intermittent, remittent, and continued fevers.

The whole form, in fact, a circle, the beginning or the end of which it is difficult, nay impossible, to determine; for the commencement of one is the termination of another, and the termination of this the commencement of the first.

We perceive the more remarkable features of disease, but only observe them as they agree with corresponding actions of the system.

Epidemic cholera and dysentery make their attacks principally between midnight and morning ;—

Quotidian ague follows in the morning ;

Tertian ague at noon ;

Quartan ague in the afternoon ;

All these, and their thousand varieties of all degrees of severity, observe certain actions correspondent to similar relative conditions that exist at the same periods in health ;—the diseased movements are influenced by the natural actions of the system,—as these themselves are by the period of the day, the day by the period of the year, the year by periods of more lengthened revolution. Hence vernal quotidians at the beginning of the year, tertians in summer, and quartans in autumn, corresponding, as it were, with the morning, noon, and afternoon of day.

All these prevail under varied forms of type and severity ; sometimes so mild, as scarcely to be entitled to the name of fever ;—at other times so severe as quickly to prove fatal ;—sometimes a universal epidemic in the form of quotidian continued influenza ;—at other times occurring in solitary sporadic cases ;—and on all these, as never failing constant attendants, are found cholera, dysentery, and diarrhœa.

These fevers, under certain circumstances of season and locality, present many varied forms of the remittent and continued types, in which, however, still can be traced the original paroxysms of the fever, daily recurring at the corresponding periods in the natural actions of the system. Hence continued quotidians in spring, tertian in sumner, and quartan in autumn, all preceded, accompanied, or succeeded by cholera, dysentery, or diarrhœa. Thus, for example, the consecutive fever of cholera in Russia, Dr. Russell informs us, could not be distinguished from an ordinary continued fever ; and all over the world we know diarrhœa was the premonitory symptom of the same epidemic.

It need scarcely be repeated, as a warning against the fallacy of drawing hasty conclusions from solitary examples, which will occasionally be found to occur, that these no more affect the general character of the epidemic, than a solar eclipse does the everlasting return of day and night ; *exceptio probat regulam.*

It is satisfactory therefore to observe that we can thus make some approaches to a nearer view of cholera, in having pointed out its period of attack in relation to the development of fever :—thus, clearly displaying the intimate connection of the former with the latter, either in its severity as destroying all chances of reaction, or, in its mildness, allowing of the subsequent febrile movement denominated ague, which ushers in, with more or less severity, every form of the disease that can possibly occur, from the simplest type up, through all the subsequent grades, to typhoid " bilious" remittent.

We perceive, therefore, from the foregoing observations, that the actions of disease are regulated by the daily actions of health, the daily actions by the yearly periodical revolution, and the periodical revolution by more extended periods of time.

The daily fever of life is the miniature of our lengthened existence; the dawning of day is like the dawning of life; the gilded meridian like the glittering dreams of ambitious maturity; and the twilight of eve, like the heavy eyelid of decrepid age.

This ague of life is only the lengthened ague of a day, often assuming a character of unnatural intensity, returning at the periodical periods, or *continuing* with more increased severity till the destruction of life.*

Stifled in the birth this ague is the collapse of cholera ; but nourished and matured we behold the fulness of its development in the last stages of remittent fever.

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* Ludolf gives an instance of an eight-day ague continuing for eighteen years. We have abundant examples of the continuance of the regular quartan for nine, twelve, eighteen, twenty, twenty four and thirty years, and one instance of its lasting for forty-eight years.—*Good's Study of Medicine.*

SECTION III.

CHOLERA.

PHYSIOLOGY, PATHOLOGY, AND TREATMENT.

Throughout the pages of this volume there are every where interspersed observations, more or less illustrative of the present subject. Indeed I find every circumstance connected with the different forms of the epidemic so intimately dependant one upon another that it is altogether impossible to illustrate the one without unavoidably alluding to the other; they are, as it were, dovetailed together in an inseparable manner. In all these observations I have endeavoured to confine myself strictly to evident derangements of functions which can admit of no mistake; avoiding all allusion to the numerous theories that have been advanced regarding the disease, not one of which but serve to render more obscure the natural view that ought to be taken of the evident development of symptoms, as connected with the still more evident actions of the system in health.

The period when the severest attacks of epidemic cholera are experienced has been remarked as occurring during some period of the night, generally a little while after midnight, a time when the body is least exposed to the influence of the febrile constitution; and this whether amongst the young or the old, the rich or the poor, many of them surrounded with every comfort and convenience conducive to exemption from the morbid influence.

On surveying, however, the natural conditions of the system, as observed at different periods of the twenty-four hours, we perceive striking contrasts to exist between them; and, at the time of the invasion alluded to, we find that the condition is favourable to the development of the disease.

It is evident, therefore, that the system must have imbibed the epidemic influence prior to this period, as otherwise it is contrary to reason to suppose that the latter exerts its specific effects directly on the functions at a particular hour of the night. The case of Marshal Diebitsch, taken at random from amongst thousands, will serve to show the periodical return of diseased development, resembling, in every particular the circumstances attending the paroxysms of quotidian ague. On the morning of one day there was, as related, a tendency to the development of the disease, and as the natural fever of the day resumed its ascendancy, the symptoms of derangement wore off; but on the periodical return of the diurnal period, the symptoms were earlier developed with fatal intensity.

As cholera denotes a more concentrated state of the epidemic constitution, some observe its effects are more speedily developed than when in the condition productive of fever, as observed on entering those localities where it happens to be raging, when it generally is found to break out in newly arrived individuals within twenty-four hours, and for the most part during the night, although these individuals may have been removed to a distance from the spot where the disease prevailed. The disease delays its attack in consequence of the presence of the natural diurnal fever, and seizes the period, when this last has subsided, for the development of its particular symptoms. This period is during the night, generally after midnight, at a time when the blood is collected in the venous system, when its motion is slow and languid, when the action of the heart is comparatively at rest, and when the respiratory action scarcely disturbs the tranquil condition of the mass of fluids collected in the venous and absorbent system.

This is the state of affairs after the cessation of the natural diurnal fever, during which last, the arterial system had been acting the principal part in the scene, in furnishing the vast quantity of perspiration, the aqueous exhalation from the lungs, and the watery portion of all the secretions in the system,* thus constituting the stage of resolution of the natural fever of the day. The blood now collected in the veins has, from this expenditure alone, acquired an increased tenacity productive, more or less, of its languid motion, thus inducing sleep, and the consequent cessation of nearly all propelling motion, which is evidently a proof of design in the contributing agency of other means, thus consecutively afforded, of permitting the fluid to remain at rest till a fresh supply (of the aqueous and other portions, expended during the day) has been absorbed to thin the blood and to admit of its free transit through the pulmonary tissue, and the subsequent easy and natural repetition of the same process of diurnal resolution.

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* Being desirous to confine these observations within the shortest space, I here, as in other parts, only allude to general useful practical principles, and have consequently omitted the mention of many circumstances of interest, such, for example as the evolution of carbon said to amount to eleven ounces in the 24hours. I may here remark that the deficiency of the same is correspondent to the absorption of oxygen, both depending on the velocity of the blood.

It is at the period of the above mentioned condition, when the whole of the fluids in the system are, comparatively, in a more or less stagnant condition, that the epidemic influence, already existing in the body of the mass, betrays itself in the still further increased viscidity of the blood which now takes place.

The first effect of this condition is, as might be supposed, a corresponding difficulty of the passage of the fluid through the pulmonary tissue; and, consequently, not only is there a diminished supply received by the arteries for carrying on such processes as are constantly necessary, but that supply is deteriorated, and unfit for those assimilating purposes for which it was required. It is perfectly plain, therefore, that, as there can be no chylification carried on under these circumstances, the blood consequently can receive no fresh supply, and must necessarily increase more and more in viscidity.

Man must daily take in a supply of food to enable the blood to make good the losses it has sustained. This food the *blood itself must digest* and assimilate in the stomach and bowels *before* it can make use of it. This is affected by the salivary, gastric, splenic, pancreatic, hepatic, and intestinal secretions; and these secretions are furnished direct from the blood. Now it is perfectly plain that the blood, in the viscid and altered condition it is in on the occasion of the epidemic invasion, cannot be conveyed into the tissue of these glandular organs, (or, if partially conveyed, will be languid and viscid like the general mass,) and consequently that these glandular organs cannot afford their secretions, and consequently that the assimilation of the aliment cannot go on, and consequently that there can be no chylification, and consequently the blood can receive no fresh supply, and consequently it must continue to increase in viscidity, both from the direct influence of the epidemic agency, as well as from the constant escape of aqueous vapour, in the form of diapnœ, from the surfaces of the skin and lungs, (a process* which takes place without ceasing in all bodies animate or inanimate.)

The viscidity of the blood continues, it circulates however in part slowly through the pulmonary tissue. The venous system remains, more or less, engorged, and a heavy slumber is the consequence.

The blood continues to make every endeavour to promote the secretions for the purpose of assimilating the aliment, but all its attempts are fruitless, and the mass of food at last begins to undergo changes similar to what it would do out of the body under the same circumstances of trituration, admixture, heat, and moisture.

A new train of symptoms now set in which soon rouse the individual from his deep unnatural slumber.

He sits up wondering at the unusual feeling of distension and pain about his abdomen, with a desire to vomit, as if every thing he had last eaten still remained upon his stomach. Vomiting commences; and some sour semi-digested matters are thrown up: this, however. affords only temporary relief; the vomiting again returns and continues with extreme violence, but nothing is now thrown up because the mass of undigested matters has passed down into the small guts, where they occasion the same irritation of the mucous membrane as already established in the stomach, and which still keeps up the vomiting at intervals, at each of which paroxysms the skin and other mucous surfaces become bathed with clammy sweat, which is *forcibly expressed through the tissues* during each violent fit of vomiting. The blood consequently becomes still more viscid after each muscular compression that it thus undergoes; and it now circulates with extreme difficulty through the lungs. The anxiety of countenance depicted betrays the mental suffering of the patient from feelings which he cannot describe, but which are referred to the chest and stomach principally.

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* Oleaginous frictions over the body (as a prophylactic in plague) also regulate his constant escape of the water of the blood, consequently keep it in a *natural* healthy state; while the oleaginous vapour inhaled by the lungs has also a similar effect; as well as that it may also in part be reduced into its origina elements at a time most required.

From a vessel of water covered with a film of oil, there will be no evaporation, the body of fluid will constantly remain entire.

By this time the matters have passed lower down the tube; the scybala, which often exist in the rectum and lower part of the sigmoid flexure, become loosened, and there is presently a sudden and copious gush of matters of an extremely offensive character. This is followed by a tendency to syncope, with clammy perspiration, and then for a while there is a short respite. But the matters that still remain in the tube, continue to undergo further changes, and to acquire additional corrosive or irritating properties: hence the excruciating griping pains in different parts, wherever these matters happen to rest, and which is generally between two constricted portions of the canal. If the mucous membrane be in a state of general irritation, or if (what is often the consequence of improper treatment) the diarrhœa has been suddenly checked, then irritation and spasm of the whole canal take place, and the corresponding sensitive nervous columns are influenced, and the motive circle, whether voluntary or involuntary, is put in motion, and violent spasms succeed, sometimes of every muscle in the body, and the individual immediately expires.* Generally speaking, however,the spasms are most commonly in the lower extremities, occurring after each griping pain and scanty evacuation, more or less of a watery nature, often starchy, or in other instances cloudy or muddy and extremely offensive. When the right colon is the seat of pain and spasm, the cramps soon succeed in the feet and leg ,of the same side, with the feeling as if the muscles were pressed in a vice; they are induced by the abnormal irritation and contractions of the right colon acting on the corresponding sensitive nervous column, which are perceived antecedent to the spasm of the extremity, and consequently the result of the corresponding motive circle, excited to involuntary action, the effects of which are not appreciated till the pain of the spasm is subsequently induced.

When the irritation and spasm are in the left colon, and especially in the sigmoid flexure and rectum, at the time of the evacuation, the corresponding spasms are also in the left extremity upon the same principle already explained, the diseased influence being here upon the sinistral columns of the sensitive and involuntary system of the circles of nervous expansions.

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* This I have seen in one or two instances.

When the mucous membrane of the small intestines is more particularly the seat of the extreme irritation and inflammation induced by the presence of the unassimilated matters, then the intense spasms of that part of the tube follow as a matter of course, and the more immediate central circle of nervous columns must of necessity partake of these diseased actions (on the same principle as they regulate and obey the healthy ones), and consequently spasms and pain take place in the abdominal corresponding muscles, more especially visible in the recti which stand out in knots produced by their own abnormal contractions: ball-like irregularities are also formed upon the tube by the alternate contractions, and are perceived through the abdominal muscles, and observed to shift from place to place, according as the contents of the bowels proceed downwards, or force their way through the strictures of the tube, which, from the extreme irritation within, is often contracted so as scarcely to admit of the passage of a crow-quill. Even the colon, that capacious tube, equally betrays a repugnance to the abnormal condition of its contents, and is, in consequence, often contracted throughout its whole length, so as scarcely to admit a common bougie; in fact, its mucous surface is in close approximation. This last is one of the most unfortunate circumstances that can occur, and so much the more to be lamented, as it is often the consequence of the treatment employed, especially of that which consists in the administration of astringents, stimulants, opiates, &c. &c. The regular and *natural* actions of the system, attempting to throw off the disease, instead of being assisted, are, on the other hand, effectually paralysed: the crudities of the bowels are not passed off;—they distend the small intestines which cease to carry on the peristaltic motion; the irritating contents continue to be retained, swelling out the tube at various places (inducing intense pain and spasms), and in which, after death, a more or less complete destruction or dissolved condition of the mucous membrane of the corresponding portions is found to exist:—it is soft and semi-gelatinous-like, of different colours, often red or bloody; and if the gut is much distended, the coats will be found diaphanous and minutely injected, easily torn, the muscular scarcely perceptible, and the peritoneal more or less inflamed. In the *immediate vicinity* (N. B. observe this particularly) the gut will be found in a perfectly healthy condition; but we perceive how contracted it is; it has taken care to exclude the offending contents already mentioned, and consequently enjoys exemption from disease. In some instances indeed, the tube has been found to be wanting at these particular places, that is, it had given way, being unable any longer to overcome the pressure exerted upon it by the contents forcibly kept in their position by the spasms of the neighbouring portions of the tube refusing to admit the passage of the irritating materials in question.

The evil consequences, therefore, of the condition of the colon spasmodically and imperviously contracted, as I have pointed out, will at once occur to the reader; this point is the most important of all in the treatment of cholera to be borne in mind. Forgeting this, and with the attention directed to the abnormal vomiting, and other more evident symptoms developed, as a consequence of disease, in the upper portions of the tube, every effort to afford relief will only hasten the fatal termination, as long as the former condition remains; the irritation and inflammation of the mucous membrane of the small intestines will be kept up by their contents, which are thus prevented from passing along.

The caput cœcum, however, often happens to be distended: this is natural; because the fluids continually acting by their pressure affect this; its mucous coat shares in this similar disease a similar misfortune to those corresponding portions of the same membrane in the small intestines.

As in the principal type *of this fever turned in upon the bowels*, the caput cœcum is often found the most diseased, so in the other forms, viz. epidemic dysentery and diarrhœa, the very same holds good, and here, in the corresponding part, is found the most extensive disorganization, irritation, ulceration, inflammation, and mortification, whilst all around will be in perfect health, as I have pointed out in speaking of dysenter to which head the reader can refer.

If the contents of the stomach and duodenum should be prevented from passing readily along through the jejunum by the presence of these abnornal contractions already described, then, as I have stated, the muscles which will be thrown into action are those immediately subservient to life, and consequently death will much sooner happen in instances of this description; even leaving out the diaphragm altogether (which I will here suppose, in consequence of its existence not being indispensable to death in this disease, which may be inferred not only from the principal morbid appearances, but from the fact of the epidemic proving quickly destructive to the feathered tribe in which this organ is wanting) the spasms of the intercostal and abdominal muscles (induced by the abnormal condition of the connecting and corresponding circles of the sensitive columns taking place on the same principle and in the very same succession as the natural actions of the same parts) are sufficient of themselves to induce death; and which they sometimes do by preventing inspiration, and, consequently, the application of the oxygen to the expanded surface of the lungs, which, it should be recollected, cover a space of one hundred and fifty square feet, or ten times that of the external surface of the body (as estimated by some physiologists); and, consequently, the more tardily the blood flows, the greater necessity for inspiration, and therefore the greater danger of its suppression at such a time even for the shortest period. We hence find that individuals in the collapse of cholera will often continue to live for hours after the pulse is gone (the oxygen being conveyed through the tissues), and, in some cases, to recover; but that if it is attempted to make them sit up or undergo the *slightest exertion*, the small remaining sign of life immediately disappears (observe, not from asphyxia)

The whole respiratory system of muscles is involved, either in the abnormal spastic rigidity at one time, or in the subsequent overpowering atony at another;—consequently the phatysma myoides, the sterno-mastoid, sterno-hyoideus, and theroideus, amo-hyoideus, the pectoralis major and minor, the subclavus, costo-clavicularis, serratus magnus, &c. no longer assist in respiration in the one case, nor in the other of spastic rigidity from the atony of the extensors rendering the thorax the fixed point.

This is the natural consequence of the sternal fibres of the nervous columns being in abnormal action, while in the atony of the general system the counteracting forces of the muscles for effecting respiration are no longer available. The abnormal action of the diaphragm is as equally inefficacious, as it is hurtful, because the spastic rigidity of the abdominal muscles present an opposing and overpowering force (as if the diaphragm were altogether absent as Ih ave mentioned).

The intercostals, involved in the same abnormal action, are thus equally injurious, whether they are opposed or not by the corresponding spasms of the costo-abdominalis, ilio-abdominalis, lumbo-abdominalis, sterno-pubialis, pubio-sub-umbilicalis, ilio-costalis, &c., which are, at the same time, influenced by the similar corresponding sternal columns of sensitive nerves.

Confirming this condition of the sensitive sternoid columns,at the same time, and by the like influence of the same system of nerves, the thighs are seen to be drawn *inwards* towards the abdomen by the psoi and iliacus internus muscles.

The higher the irritation of the mucous membrane extends, the higher are the corresponding spasms developed.

The connections of the phrenic nerves with the cervical and their origin, and the inosculation of the sympathetic ganglia both in the neck and elsewhere with the same and the pneumogastric, at once point out the origin of the spasms of the flexors of the superior extremities; upon the same principle that the reciprocal action of the nervous columns, as before mentioned, induce the contractions in the inferior.

As might be expected to follow the diseased influence on the nervous expansions of the sympathetic and pneumogastric, so the heart and the muscles of the trachea and œsophagus partake intimately and directly of the general abnormal condition. The generally asphyxiated condition, however, does not appear to be owing to spasm, but principally to the viscid condition of the blood unable thereby to reach the left side of the heart; for cases have occurred (as I have already mentioned) where the pulsation had continued after the action of the heart had ceased.

Cases of trismus have, in some rare instances, occurred in cholera; the particulars of these I have not seen, but the injury sustained must have been of an aggravated and continued description, involving the origin and expansions of the nervous masticatorius.

The spasms in cholera are superadded symptoms, the result of irritation upon the nervous expansions on the mucous membrane in a greater or less severe degree. But whether there exist spasms or not, there is always present the most overpowering sense of sinking, and a complete inaptitude and inabliity for *voluntary* exertion; consequently the individual affected sinks at once to the ground, and, when spoken to, it is with difficulty his answer can be heard; he has not the power either of speech or (scarcely) of respiration, and answers questions by signs. The condition of the voice and speech receives a satisfactory explanation both in the atony of every muscle in the body, as well as in the distribution of the reflected branches of the eight pair of nerves and their connections with the numerous inosculations of the sympathetic.

The connection, too, of the diaphragm with the organs of voice, explains, in its diseased or abnormal condition, the corresponding influence that must be exerted on the power of articulation.

Bellingeri observes that the hypoglossal nerves, besides being distributed to the whole of the tongue and its muscles, and to the voluntary muscles which move the organs of voice, transmit also twigs to the diaphragm; and, as it is evident that the hypoglossal nerve is subservient, in other organs, to voluntary motion, he infers that, in this distribution, it must perform the same function to the tongue, and it, therefore, is the nerve for articulate speech, and modulated sound in singing,—an inference which derives confirmation from the fact that in fishes this nerve is wanting.*

The peculiar condition of the voice, often even in the premonitory diarrhœa, being indistinct and husky, would seem (in addition to its proceeding from the similar irritated condition of the pneumo-gastric expansions as existing along the whole tube being sympathetically established in the expansions of its branches to the larynx) to be also in a great measure dependent on the altered condition of the arterial system, more especially as regards the aorta and right subclavian artery, round which the recurrent nerves are reflected; since a condition of repletion and excitement of the arterial system are attended by increased energy in the sound of the voice, which is well illustrated by venous injection restoring the voice in the worst cases of collapse.

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* Walker's Nervous System.

The clammy condition of the fauces and œsophagus, and the irritation of the nervous expansions of the glosso-pharyngeal and eighth pair spread out on these parts, occasion that intolerable thirst the invariable, and most distressing, symptom that the patient expediences.

The blood continues to increase in viscidity, and, consequently, to accumulate in the venous system, as it cannot flow through the lungs. Vomiting or rather retching continues, and a partial clammy fluid is, during the exertion, forced from the blood thus subjected to pressure. The disorganization goes on in the mucous membrane of the primæ viæ, and the neighbouring vessels discharge their contents from their now opened extremities.

The thickened condition of the blood prevents completely any secretion from being poured out; consequently, from first to last there is not a trace of any of them. The bile, for instance, which, if it was secreted even in the smallest quantity, would by its colour soon be recognised, is never seen throughout the progress of the disease. Any bile that may have been in the gall bladder partakes of a similar viscid conditon to the blood, having also lost its watery portion, which has been absorbed by the system. The constant presence of thick bile in the gall bladder has been thought to have some influence in the production of the disease; but many animals want this organ, yet perish from the effects of the epidemic: among these are the horse, the stag, goat, camel, elephant, &c.

The absence of the urine has also been thought to be connected with the production of the disease, but this fluid can no more be secreted than the others, the circulation is at a stand, and the elements for their elaboration are of course not presented to the glands;

nor would they even be secreted if the blood did circulate partially, as long as it was not liberally supplied with fluid: hence it is found that the urine is not secreted for some days, often, after escape from the severe symptoms, unless fluids have been liberally allowed.

When the purging is not free, and the inflammatory symptoms of the tube severe, the urine is sometimes secreted in small quantity; it is expelled by the involuntary spasm of the bladder generally during an evacuation.

Great distension of the abdomen is present in some instances; it is found in those cases which have not been admitted early to treatment; they are generally fatal; stricture and inflammation of the tube being present; they are difficult to recognise; the febrile diathesis being developed, with a cessation of the purging.

During the reigning of the epidemic constitution let it be constantly borne in mind, in the treatment of constitutional diseases during that period, that those presenting a febrile development or a condition of excitement, or irritation either mental or bodily, *without the prominent symptoms of diarrhœa, dysentery, or cholera*, are merely examples of these last symptoms being so mild and of so transitory a nature as not to attract the attention either of the individual concerned or of the medical attendant. (Even in some of the most violent affections to which the body is liable, we find the same apparent obscurity as to cause and effect constantly bewildering the imagination; as, for instance, in hydrophobia: here the cause is often not even known, or has been forgotten by the individual, and frequently there is no circumstance visibly connected with the symptoms, sufficient to attract the attention of common observers.)

Now, during the reign of the epidemic constitution we observe two different conditions of disease presented to view;—one consisting in the repletion of the arterial system constituting the febrile diathesis; the other, the repletion of the venous witnessed, in excessive preponderance, in the collapse of cholera.

While we observe this, we likewise perceive that the epidemic has its periods of intensity clearly defined, and that while, at one time, during the height of its activity, the whole community will be affected with discharges from the bowels, at another time these same discharges will be so slight as to escape particular observation, but the necessary consequence will be universally displayed; that necessary consequence is the absorption of these matters (which would, under a severe epidemic manifestation, have constituted these discharges) into the circulation, and the unavoidable display of febrile symptoms; in other words, attempts of the system to throw off the semi-chylified fluids, which are a cause of irritation throughout the whole capillary expansion. Therefore, it is perfectly clear that the cure of this diathesis must consist in assisting nature to throw off by the skin these matters, first, by the topical or general abstraction of blood, according to circumstances, and, secondly, in the restoration of chymification. This is the only natural treatment of this asthenic epidemic. Let not the reader therefore confound the foregoing affections with diseases of an inflammatory nature, and especially where the alkaline diathesis is in excess.

I have already stated that the period of development of cholera corresponds with the periodical diurnal revolution of the natural collapse of the system, at the time it is endeavouring to recruit its energies, and gather all its scattered forces for the campaign of another day; and that before it has accomplished its object, it falls a prey to the attacks of the disease. To pourtray still futher the unavoidable tendency of the blood to favour the morbid development at the period mentioned, I will make a rough calculation of the daily expenditure of the fluids necessary for the continuance of life, by which it will be also more clearly perceived that the period in question must be that of all others the most obnoxious to the influence of the disease. It will be impossible to estimate with perfect correctness the quantity of the different secretions, because they constantly vary, nor has their average ever been ascertained; but an approximation can be made sufficient for the useful purpose of directing the attention to the important subject.

For instance the quantity of bile varies in every individual according to the quantity and quality of the food. Where this is moderate in quantity, and nutritious, with traces of the alkalies, and the bitter principle, and a moderate proportion of fluid, the bile will be secreted in extremely moderate degree. But in cases of gluttony, or where the individual is everlastingly cramming himself with all manner of aliment, the bile will be (and must be for health) secreted in as excessive abundance. It is, in fact, everlastingly poured out on the aliment as it passes along the duodenum; and, when it is interrupted in such cases, (of error in the judgment of the quantity and quality of the diet), the effects are developed in proportioned severity. Hence if two individuals, one a glutton, the other a *rational* epicure, arrive together in a locality where cholera prevails, and retire to rest under *their usual* circumstances,—the morning will dawn on the corpse of the glutton, but the epicure will only be found shivering in the paroxysm of quotidian ague.

In connection with the same important subject, and one of the same general import as the foregoing, as influencing the development of the different forms of the disease during the prevalence of the epidemic constitution, may be mentioned the fact, that the recent preparation of the daily food obviates the liability to the intense influence of the epidemic constitution: hence in a certain number of individuals, immersed in the febrile atmosphere, those who have replenished their systems with recently prepared food will escape the severity of disease; while the others, whose cravings have been satiated by the remains of the previous day, will perish in the type of epidemic cholera. But to return to the consideration of the expenditure of fluids, and the steps of the process by which the same is brought about:—we will suppose, for example, the fluids at 50 pounds, and that of these there are 40 water, 10 solid,

Loss by transpiration, pounds ..	4 ½
Perspiration, ..	2 ½
Urine, ...	1
Stool, ...	0 ¼
Secretions necessary for the chylification of the fresh supply of food, to repair the foregoing loss.	
Saliva, ...	0 ½
Gastric juice, ...	1

Pancreatic,	0	½
Bile,	1	½
Intestinal,	1	½
	13	¼

The circulation is now minus these thirteen pounds. The epidemic influence which has been exerting itself is now established. The thickened column of blood, accumulated on the right side of the heart, flows with difficulty through the lungs. The pressure it exerts completely prevents the entrance into it of any fluid, from the absorbent system, that may be ready to be poured into it, and by the addition of which its passage through the lungs could alone be freely effected.

The portions of unassimilated aliment begin to undergo changes, and to establish irritation in the stomach and bowels (assisted by the pressure of the venous column), and the discharges commence.

Loss by vomiting,	4	½	
Stool,	13	½	
Forced perspiration,	5	¾	
Alimentary secretion remaining in the bowels,	2		
	39		
Deduct the secretions and alimentary matters,	19		
Total expended,	20		Remaining 30 including the 10 solid ingredients.

From this will be perceived the succession of events which take place in cholera, and which form, as it were, a connected chain perfectly traceable from first to last. The expenditure will appear great; it is great as an average, but not so great as has been observed. M. Magendie has, in some instances, not been able to collect more than from six to ten ounces of blood after death.

In some cases the blood itself is poured out from the surface of the bowels, resembling those sudden cases of dysentery which sometimes occur, where immense quantities of blood are passed by stool from the abraded surfaces; so that it is perfectly plain there can be no limit in cholera to the expenditure of the circulating fluids.

When the foregoing train of actions has been established, the blood no longer circulates, it can be seen distending the superficial veins, not in a continuous line, but only here and there where it is coagulated; the intermediate spaces are those which contained it previous to the aqueous portion having been freed from it by the abnormal action of vomiting and spasms exerting a powerful pressure upon the column of blood which is continuous from the extremities to the heart, and not affected by the valves, from the obvious reason that they are convex towards the centre. But at the period I mention, of the coagulated portions forming elevations in the veins, the active stage has passed, the aqueous portion has escaped, and the blood no longer forms a continuous column.

The watery portions, at this period, ooze out through the skin of their own accord, forming that greasy moisture characteristic of the last stage. The copious perspirations in the earlier stages are forced out, as I have mentioned, by the pressure resulting from the violence of the vomiting and spasms.

Such are, therefore, the train of symptoms brought about by the condition of the blood, *the effect of epidemic influence.* I have only traced the development of those successive stages, *visible* (as I formerly proposed) *to the naked eye.* This is all that is looked for in a practical essay like the present. Nor could I go further if I wished. I know no more what the other baneful influence is, than I know the reason why the blood should be red, rather than any other colour; or why the period of pregnancy should be nine months instead of any other number. We have not yet ascertained the arrangement of that machinery that developes the evident actions of the system; the last we can only perceive, and it is these I have attempted to trace. And, however imperfectly this has been done, it may still serve the purpose of pointing out the method by which much information may be elicited; in which light it will be viewed by the intelligent physician.

The same obscurity hangs over the operation of many valuable medicines, such, for example, as quinine, which however appears to owe its efficacy to the particular constitution of its essential elements combining to render its bitter principle of a nature approximating to that of the biliary secretion, whose deficiency (in all the forms of the epidemic) it contributes to supply.

I say the same obscurity hangs over the operation of many valuable vegetable substances, that is to say their analyses are not sufficient to enable us to decide upon the nature of their specific action; for instance the analyses of quinia, morphia, and strychnia are instances in point; (*they are given below*[*]); we may speculate upon the difference of composition, and certainly theory may enable us to go a considerable way in accounting for the specific action (for instance) of quinine when compared with the others; yet when we are aware of the fact that one or two hundred grains of quinine may, in extreme cases of fever, be taken with impunity, we find all theory regarding the composition of the substance fail us when compared with the effects of strychnia, a few grains or parts of a grain of which are sufficient to cause death. We cannot suppose it is the effect of concentration since analysis would then count for nothing. The excess of hydrogen and nitrogen, and the marked deficiency of oxy-

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[*]

	Quinia	Morphia	Strychnia.	
Carbon,	75.76	72.20	77.21	
Hydrogen,	7.62	6.24	6.73	
Nitrogen,	8.11	4.92	5.96	
Oxygen,	8.61	16.66	10.10	*Lancet.*

gen in quinia might enable as to theorize with apparent rationality on its peculiar operation in the class of asthenic miasmatic fevers; but then when we come to make comparisons with the violent disproportionate effects of strychnia, our reasoning we find will not carry us through.

We can judge however this far that from the nature of these asthenic miasmatic fevers, alkaline remedies would be naturally indicated in the cure, and hence accordingly do we find that they possess that character. Nothing than this fact could be a stronger proof of the truth of the natural doctrine of the epidemic.

From the general remarks that I have made upon the order of successive symptoms, whose development are thus shown to be susceptible of explanation upon natural and evident principles, it follows that the same train of reasoning should be applicable to the other forms of the epidemic, and that it is so I shall endeavour briefly to explain by the assistance of reference to what has been already said.

That the appearances displayed will often vary there is no doubt; but the variations consist of superadded symptoms and must not be confounded with the original diathesis, nor must the appearance of the blood, when drawn in the after stages, be confounded with the original appearance it presents at the period of development.

I have said the period of their development, because when once the disease is established it may afterwards assume many forms and varieties differing in different cases, in all of which the blood will widely vary from the condition in which it was at first, when it presented characters corresponding, in a greater or less degree, with the appearances observed in that fluid in the different forms of the epidemic.

The establishment of obstruction, irritations, and their invariably succeeding train of inflammations will cause, or be concomitant with, a change in the blood, different from what it was at the commencement of the disease.

In cholera the blood is in appearance changed from the very commencement, and all the subsequent development of symptoms can be traced, in succession, from the consequences of its altered condition, as I have endeavoured to point out when I briefly considered the symptoms of the disease.

In the collapse of epidemic, ague, also, the blood, when drawn, presents a dark appearance, and a more or less viscid character; and it does not separate like healthy blood, but forms a loose coagulum parting with little serum, and never presenting the buffy coat.

When, however, reaction may have been established, and pyrexia more or less developed, whether terminating in 24 hours, or gliding on into the severest type of fever that can possibly occur, then, in proportion to the change in the symptoms of the disease, partaking now of widely different characters, so will the blood present corresponding changes, having no resemblance to its first appearance.

Hence it is that bleeding of itself, although it will relieve these superadded symptoms, yet will not cure the original disease, as was exemplified in that fatal epidemic of 1817 which extended all over India, and received different names at different places, as for instance, "The Nagpoor fever" at Nagpoor, where the abstraction of blood in any quantity entirely failed in removing the original disease; and the mortality was great, till a mixed treatment was adopted, one for the relief of the superadded symptoms, and another for the support of the patient, without which last he almost always sank.

In epidemic dysentery also the symptoms are ushered in with a corresponding change in the appearance of the blood as presented on abstraction at that period.

It never presents the buffy coat, has a dark appearance, and a loose coagulum, all, however, varying more or less in different cases, in proportion to the singleness of type, or complexity of superadded symptoms.

Hence in this affection, as in the two preceding, the blood will frequently be found to present very opposite appearances at different periods of the disease.

When complicated with fever, as I have mentioned under "contagion" the blood will present a different appearance to what it does in simple epidemic dysentery; or when the ulcerations have penetrated deeply into the coats of the intestines, wherever these may happen to be, then the unavoidable consequence is inflammation of a more or less portion of the parietes of the tube; and if the ulceration has reached the peritoneal covering, the inflammatory symptoms will be still more violent, and the blood present an appearance quite different from what it did at first.

Hence, as mentioned in the former type of the epidemic, so in this, bleeding will not remove the disease, although it relieves superadded symptoms; yet frequently it is of no avail whether in the lowest type of the disease that sometimes, when epidemic, runs its course in 12 hours, or in those cases, where perforations have been established, attended with the most violent symptoms.

In cholera, when the discharges are suddenly stopped, either from circumstances of a spontaneous or induced character, the disease immediately puts on new features; spasms and twitchings of the extremities make their appearance, the consequence of the irritation in the stomach and bowels increasing from the sudden check of the discharges, and the pain and spasms, both of the intestines and the abdominal muscles (induced by the expansions of the anterior columns of vital or involuntary nerves) require the abstraction of blood for their relief.

This blood will vary in different cases, therefore, in proportion as such superadded symptoms prevail in greater or less intensity, and if pyrexia, in any degree, should be also developed, there will be presented the anomaly of the buffy coat, as mentioned by Mr. Twining in his Diseases of Bengal.

So that we perceive the blood will vary the more, in proportion as the febrile diathesis is developed, which we have seen took place to such a well marked degree in Russia, during the prevalence of the epidemic, that Drs. Russell and Barry inform us it could not be distinguished from an ordinary continued fever; and they likewise tell us that this fever propagated itself by contagion, and produced true blue cholera, to which however I have adverted under the head "contagion."

In all the subsequent stages of these forms of the epidemic, and all their many varieties, whatever disease may happen to be superadded, or whatever appearance the blood may present, it is to be considered entirely apart from the original idiopathic characters of the epidemic.

As in cholera the diseased appearances are sometimes in one part sometimes in another of the alimentary canal, so in dysentery do we find the same inconstant character presented in a more marked degree from the circumstance of its longer duration.

Sometimes the rectum will in this last be most diseased, the ulceration even extending to the external integuments, destroying the organization of the parts, so that the cavity of the pelvis is presented to view.

In other instances the caput cœcum and ascending colon will be the principal parts affected, the mucous, cellular, and muscular coats destroyed, the muscles and nerves involved in a mortifying mass; and there will be excruciating pains extending down in the direction of the crural nerves and psoi and iliacus muscles implicated.

In cholera the same diversity is found but not so marked from the shorter duration of the disease. The sudden and violent spasms are sometimes in one leg, sometimes in another, changing about according to the portion of the tube that is suffering most. This I experienced myself, as well as observed it in many cases; the spasms following from right to left according to the passage of the contents of the bowels downwards.

These circumstances are mentioned here to point out the relationship of these diseases, and to prevent adventitious circumstances, occurring after their commencement, from being confounded with the epidemic character of the affection.

Hence the pains in the limbs, the affection of the crural nerves, diseased condition of the iliac and psoi muscles, ulceration, perforation, peritonitis, stricture, abscess, and innumerable other superinduced conditions of disease, are no more to be considered as the characteristics distinguishing epidemic dysentery than the corresponding superadded symptoms in cholera are to be so considered of that disease; for in the worst forms of both they are not present.

In the London dysentery, the incruenta (for instance) described by Willis in 1670,* the patient died within twelve hours with violent vomiting and purging and cold sweats.

So in these days the same occurs in a still more aggravated form and denominated the low form of cholera with perfect propriety, in as much as that the name differing signifieth not.

These diseases have so many symptoms in common that I feel at a loss to which to refer, as more distinguishing one than another.

The premonitory diarrhœa is the same in both. In 90, I may say 99, cases of dysentery out of 100, diarrhœa has existed from some two or three days to three weeks; and during the prevalence of cholera the temples of Cloacina tell too pianly the condition of the digestive apparatus.

In dysentery, the diarrhœa runs on establishing ulceration in the tube increasing in severity in proportion to the greater distance from the liver; and even in many cases the external integuments round the anus become corroded by the matter constantly passing over them; what then must be the effect of it upon the mucous membrane of the bowels, save irritation, ulceration, inflammation, and death!

In cholera the symptoms present a more rapid progress in proportion to the intensity of the epidemic constitution, the effects of which are shown in the increased thickness and blackness of the blood, as compared with that in epidemic ague and dysentery.

In the reports of cases it has sometimes been stated that the blood did not differ much from health, and even that it was florid; such could not have been genuine cases of epidemic cholera.

In all cases that I have seen, *where re-action did not take place*, the pulse has ceased, and the veins on the surface were distended with thick black blood which would not flow; showing that it was too gross to pass through the delicate tissue of the lungs to the left side of the heart, and hence the cessation of the pulse in the arteries, in which, if there is any blood, it is also found clotted.

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* Anno 1670 circa Equinoctium autumnale quam plurimi Dysenteria incruenta, verum atroci ad modum, et valde periculosa laborabant. Affectus, et subito, et frequenter, absque manifesta occasione invadens, laborantes cum vomitu immani, et sedibus crebris, et aquosis cite in maximam debilitatem inque spirituum horrenda diliquia, et virium omnium prostrationes redigebat. Novi plures pridie satis sanos et valde robustos intra 12 horas morbi hugus tyrannidi adeo miserrime dejectos, ut cum pulsu debili et exili, sudore frigido, at que respiratione anbela et elatu jamjam moribundi viderentur: et quidem non pauci, quibus remedia idonea ant medendi opportunitas defuerunt, ab eo cito interibant.—Willis Pharmaceutice Rationalis, Oxon, M.DC.LXXIV.

If we do not consider that the thick state of the blood, preventing it passing freely through the pulmonary tissue to the left side of the heart, is the cause of the stoppage of the pulse, we must then have recourse to some indefinite cause, that is not obvious or rationally applicable, such as the hackneyed one of deprivation of nervous energy, on loss of power, or such like, which, in reality, do not explain any thing at all satisfactory.

Besides, there is little loss of involuntary nervous energy, as seen by the spasms of innumerable muscles, so powerful as to require the efforts of several individuals to hold one unfortunate sufferer: and then the fact of the right side of the heart sending the blood to the lungs, will have to be explained, for it continues to propel the thickened fluid into their tissue, as far as it will go, and when it can go no further, the whole venous circulation from the lungs to the remotest parts of the system becomes distended, giving that blue appearance to the surface, and becoming there thicker and thicker after every violent fit of vomiting, during which, all the muscles in the body are thrown into action, and acting on the mass of blood all collected in the veins, force from it its remaining aqueous portions; during the intermission the skin becomes again dry, and then again moist on the recurrence of vomiting, till at last the whole remaining available portion of aqueous particles becomes expended.

Although generally acknowledged, yet there are many who do not consider the thickened condition of the blood as concerned in the production of the more violent symptoms as I have mentioned; or who perhaps are not aware of its even being a constant concomitant, I, therefore, consider it will be useful to impress the same upon the mind of the reader, as the most important circumstance in the history of cholera; being in fact a key to many of the, once to me inexplicable, phenomena. The following, therefore, exhibit the appearances and condition of the blood in cholera, as observed in both the old and new worlds.

"The blood in the vessels was unusually black, resembling tar in colour and consistence. The venæ cavæ, right side of the heart and lungs turged with blood, (in some instances) extending to the left ventricle."*

"In all the dissections, I was present at, the lungs were gorged with dark coloured blood, the cavities of the heart filled with the same, and frequently containing polypous concretions; dark coloured blood, resembling, when spread on paper, the colour of the darkest cherry was found in the arch of the aorta, and in other arteries."†

In the two foregoing extracts the reader will observe that it is not stated in what stage of the disease the patients died, which is a circumstance of importance, since the appearance, in cases where reaction had been established, would be quite different from those presented in a case dying in the first stage.

"None of the phenomena of the disease are more undeviating in their occurrence than those which are presented by the blood. From the commencement of the attack it generally assumes a darker colour, and thicker consistence than natural. In the severest forms of collapse, when a vein is opened, sometimes not even a tinge of blood appears, or it flows like treacle, and after a time running quicker, presenting a curious contrast. Serum does not seperate at the time of coagulation, but about 12 hours after a small proportion is observed to have exuded on the surface and around the coagulum.

Case 2d.—A few drops of treacle like blood was obtained.

,, 7th.—A vein was opened in each arm and a little tar-like blood flowed out; full vomiting was produced by Ipecacuanha in brandy and water, *when the pulse gradually* returned, and the blood flowed improved in colour."‡ (It appears the pulse returns before the blood flows, which must be by the passage of the fluid from the stomach direct through the tissues, hence the importance of never omitting diluents.)

Case 8th.—Black blood dropped from the arms.

,, 9th.—Four ounces of blood like thin currant jelly obtained.

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* Report of the British Board of Health.

† Keirs' report of the Russian cholera.

‡ Hazzlewood and Mordey on cholera.

,, 20th.—The blood formed a semi-fluid mass as black as tar.

,, 33d.—Ten ounces flowed in a jet at first, but soon fell to drops—case fatal—diarrhœa for three days.

,, 35th.—Four ounces of highly carbonized tar-like blood were procured.

,, 40th.—Blood dark and tenaceous—little or no serum."[*]

"There is no symptom more uniform than the black, thick, and ropy condition of the blood taken from a patient in the epidemic cholera.

Case 15th.—A vein was opened, a few drops of blood sizy and black came away, but her arm was put into warm water, and in a short time the blood began to flow freely, and changed to a more florid hue and fluid state.'[†]

The foregoing is another example of the speedy passage of fluids through the tissues of the body, and shows how cruel it is, as well as fatal, to debar their use from the sufferers from cholera. Dr. Beaumont, in his essay on digestion states, that water taken into the stomach is almost immediately absorbed; he ascertained this during experiments on digestion in a man who had an external opening into the stomach, from a wound.

"The blood is always dark, or almost dark, ropy, and generally of slow or difficult effusion."

"It is established by undoubted evidence, that the blood of persons attacked with cholera is of an unnatural dark colour and thick consistence."

"The temporal artery having been frequently opened, the blood was found to be dark and thick like the venous."[‡]

"When we can succeed in bleeding a man who is in a state of lowness and collapse, while torpor is impending, we find the blood is generally thick, black, and tatary, trickling down the arm in a low unsteady stream; and the flow very often *entirely* ceases as soon as the veins of the fore arm are emptied; this blood usually coagulates into an uniform mass, without separating into serum."[§]

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[*] Hazzlewood and Mordey on cholera.

[†] Annesly's diseases of India. [‡] Madras report. [§] Twining on cholera.

In several cases related by Mr. Twining, where the face was flushed, and in others where there was pyrexia and headach, the blood presented a buffy coat, with little serum. But these cases, as I have already remarked, partaking of a mixed character, do not affect the general conclusions deducible from the state of the blood in cholera. In one case, where diarrhœa had existed for 14 days before the attack of cholera, the blood presented the characteristic black colour. In an other case where the blood would neither flow from the arm or neck, the radial artery was opened, the blood in a languid, dark, purple colour trickled down the wrist; in all, at different times and with assistance of cupping, &c. two pounds and 5½ ounces were extracted, and there was no separation of serum: all which tends to exhibit the principle of cure, as depending on the blood returning to a fluid state, and not upon its simple abstraction from the system, which, although it will relieve pain and spasm of the intestinal tube, and the consequent sympathetic ones of the extremities, yet it will not render the blood fluid; and hence in the worst cases of collapse, it is of no use, because there is no fluid in the tissues of the body to supply the blood with the aqueous portion, and unless it is absorbed from the atmosphere, or supplied artificially, the patient gradually sinks, remaining often, for six hours, without a pulse.

But even from this pulseless and collapsed state, innumerable instances of recovery are on record, where the patients have not been harrassed and exhausted by frictions,and suffocating doses of medicine. These frictions drive the thickened blood more and more into the venæ cavæ, right side of the heart and lungs, and consequently hurry on the fatal catastrophe.

Recoveries from this pulseless and collapsed state I have myself frequently witnessed on a line of march, where the patients have been put into conveyances, with little or no hopes of their reaching the next encampment, but who, contrary to expectation, have recovered. This was in the Coimbatore district, below the Neelgherries, and when the thermometer was under 60; yet these patients complained of the extensive heat, at a time when every one else on the line of march was complaining of the biting coldness of the wind; the sick even begged to have their coverings removed, that they might enjoy the fresh air before they died; their wish was complied with; they recovered. The exclusion of the atmosphere, in the treatment of cholera (by means of thick coverings) has destroyed as many victims as the disease itself: the blood receives neither oxygen, arote, or aqueous vapour; these are its life, without them, it dies.

As an example in point, illustrative of the absorption of fluid by the skin, may be mentioned the instance of a female who, in 1829, (42 years of age, residing at Pynacre near Delph,) had, from disease, not eaten any thing since 1818, nor drank any since 1820; total exhaustion was prevented by damp wrappers. Also may be mentioned the ancient practice of applying nourishment to the external surface of the body, and had recourse to by eastern nations in cholera.

The blood being in the state described, and the first affected, it follows that in pregnancy the fœtus must share some of the thickened fluid, which, if it cannot flow through the lungs at birth, destroys life: the following is one among many instances:—

"During the cholera at Christiana, a woman, 28 years of age, pregnant at the 9th month, was attacked with cholera, the fœtus was expelled, and was almost immediately attacked with cholera, and died; the mother lived."*

Volumes might be filled with extracts from different authors showing the black colour, viscid character, and loose coagulum of the blood in cholera, but I consider these already given as sufficient; and will now make a few remarks on the blood in the other types of the epidemic, having reference to every form and variety.

Regarding the blood in epidemic ague the same remarks are applicable, and the looser the bowels have been, and the longer the blueness of the hands and feet continue, the nearer will it approach in characters to the blood in cholera. It is blackish and with a loose coagulum, better observable the severer the case. During this period (viz. of the blueness of the fingers and toes, and often the face), the system is in that state where it is an equal chance whether the blood is depurated by the skin constituting the sweating stage of ague, or whether it is retained in the internal parts by reason of its viscidity and the irritation as before described in the stomach and bowels.

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* Lancet, vol. 2nd 1834-5, p. 325.

It is at this period that a drastic purgative would inevitably cause the speedy development of cholera, and, by increasing the discharges from the bowels, soon render the blood so thick as to preclude all possibility of its transmission through the lungs to the surface of the body. Not only will drastic purgatives affect this with certainty, but even a common meal, eaten immediately preceding the period of an expected paroxysm, will insure the development of violent symptoms, attended with severe vomiting, feeling of sinking, difficulty of breathing, and the sensation of a heavy weight in the stomach. If the offending matter be speedily ejected by vomiting or stool, there will be a critical discharge by the skin, and a speedy relief to the symptoms; the violent commotion, that has taken place, breaks the consecutive stages in this instance, but, on the return of the periodical term, these different stages will observe their usual relation to each other, and be all regularly developed, provided no unusual circumstance (as above stated) occurs to subvert the regular order of succession; and this is not likely to happen because, the time of accession being calculated on, the individual is cautious what he eats particularly some time before the period of the expected paroxysm.

Repeatedly have I witnessed what I have described, and was long at a loss to account, satisfactorily to myself, for such an assemblage of symptoms, occurring and recurring, intermixing and disappearing, and again returning in interminable succession; all seemingly a mass of unravelable intricacy without order or relation, and subject to no one line of treatment, till, having witnessed many thousand cases of ague in all its forms and combinations with the other types, I could not help concluding that cholera was the fever turned in upon the bowels, (as Sydenham says of dysentery); and I accounted for the circumstance of purgatives exasperating the paroxysms of intermittents by increasing the viscidity of the blood and rendering its transmission through the tissue of the lungs more difficult, causing that oppression in the thorax with anxiety and sense of suffocation.

The frequent occurrence of the premonitory symptoms of cholera followed by fever served also to point the relation of cause and effect, as well as that the prevalence of intermittent dysentery and fever occurring together at their stated periods and modifying each other, pourtrayed a corresponding relation.

Thus all these diseases will ever be found together in the same place, at the same time, and frequently in the same individual in succession.

In proportion to the intensity of the epidemic constitution one or other will be developed in excess, varying from the type of collapse without re-action, to the forms of the epidemic where the first is mild and the latter in proportioned severity.

From the prevalence of these diseases arises the mortality of almost every locality in the world, for where one exists there do the others prevail.

Many places might be instanced as exemplifying this, and where bodies of Europeans 1000 strong would, in 15 or 20 years, by these chiefly, be swept away; as for instance Hyderabad,* a place extremely obnoxious to the different forms of the epidemic, which has again this year swept through it from the east, destroying numbers of the inhabitants and still lingering in the locality of the Europeans, carrying off men, women, and children.

While we thus see these forms all existing together and occurring naturally in succession, or intermingling with one another in interminable variety, we are also able to illustrate their consanguinity by artificial means in various ways, the most direct and influential of which is venous injection.

Dr. Anderson in speaking of venous injection, says " rigors came on occasionally, and a sense of chillness, though the body be of moderate heat; so that the contrast is perfect when compared with the former state of the patient, for he then complained of heat, though in reality, of deadly coldness.

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* It is supposed that a European regiment is carried off in from 15 to 20 years at Hyderabad by these diseases, Nov. 1837.

Dr. Girdwood,* relating the effects of venous injection (7 cases of which were successful) says of one case, Mrs. G. was so roused by the operation as to call for her infant; she sat up in bed and suckled it; for several hours she continued *well,* but gradually sunk again into collapse, and died 24 hours after the operation.

In Dr. Latta's cases the effects of venous injection were manifested in the striking contrast to the formerly collapsed and shrivelled countenance, and in several instances complete restoration to health succeeded.

The influence, therefore, that the condition of the blood possesses in the development of the different forms of the epidemic, cannot be better illustrated than by those extracts touching the consequences of venous injection, especially when connected with the corresponding changes *naturally* induced in the system, as shown by the multifarious character of the epidemic at all times and in all places.

It settles the question too of deprivation of nervous energy; hyperantheaxis trisplanchnitis, cardiogmus lethalis, and many other fanciful doctrinal appellations and theories regarding the disease. For we can here predicate recovery though death be impending; we can prevent this first stage of the epidemic from sinking further; we can thin the blood so that it will be able to pass the pulmonary tissue; we perceive the shivering fit, the subsequent re-action on the surface, and restoration to perfect health.

And the stages attending this artificial induction of the febrile portion of the epidemic, are as various and diversified as those witnessed in its natural stages. Sometimes the re-action is slight, sometimes severe, sometimes shivering, sometimes none, sometimes the most violent symptoms, sometimes the most mild.†

Such may be called a synthetical exposition of the principal features of the malady, illustrative, more or less, of every form and type in which it can occur.

While we have the power of artificially inducing the febrile diathesis, we have no less the power of repelling it again and inducing all the symptoms of the collapse stage; thus, again, analytically and conversely proving the consanguinity of the various forms. In an individual just snatched from collapse by venous injection to the extent of febrile symptoms, a drastic purgative will speedily develope the worst form of cholera, in 999 times out of 1000.

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* Lancet, vol. 1st 1831-32.

† Lancet, 1831-23.

If we minutely observe any severe case of cholera that has ever been recorded, we shall perceive, as I have already stated, that it has generally chosen the late hours of the night for the period of invasion. It would serve no useful purpose to swell these pages with a long list of cases endeavouring to point out this circumstance, because one good authenticated case, taken at random, and where there could be no design of imposing, will serve equally well to illustrate the circumstance to which I have already adverted. Besides, the fact is as well authenticated in the history of the disease, as the succeeding development of the morning paroxysm is in the history of ague. They, in fact, can as little be separated from one another, in the process of inductive reasoning from the internal perception of external symptoms, as that the vital organs of the system can be torn with impunity from the body.

The following case, illustrative of the subject alluded to, I accidently met with in the work from which it was extracted, and, although not thinking at the time of adducing cases in elucidation, yet it immediately afterwards occurred to me that the one in question would well answer the purpose:—

" *On the morning of the 29th of May*, (June 9.) Field Marshal Diebitsch *had felt himself unwell*, but, during the whole day, he appeared in good health, had eaten, and appeared in good spirits as usual, and there was nothing that excited any apprehension for his health. In the evening, at 10 o'clock, he went to bed, as he had been used to do for some days past. He was soon called up to attend some business, and still appeared quite well. *About two o'clock in the morning*, he suddenly felt indisposed, and called to his attendants, but forbid to awake any body, or even to fetch a physician. It was not till past three o'clock that, finding himself grow worse, he ordered M. Schegel, physician in ordinary to the emperor, to be called, but desired that nobody else should be disturbed. When the physician came, he saw symptoms of cholera, which soon became very violent. The patient was immediately bled, leeches were applied, and *very strong friction employed ;* in short no means that might afford relief were neglected. The Field Marshal retaining all his presence of mind, ordered every person, except the medical attendants to quit the room, for fear of their taking the contagion. About seven, the physician succeeded *in producing perspiration,* and the patient became rather more easy. Up to this moment, the cramp had been but slight, and the patient suffered only from the *alternate fits of shivering and burniny heat.*

Between 7 and 8 o'clock cramp commenced in the legs and internal parts of the body, and the intermitting pains which seemed insupportable continued till near ten o'clock, when the groans of the patient became less frequent, but his vital powers evidently diminished ; the breathing became more and more difficult, the patient soon fell into a kind of lethargy scarcely interrupted by the unfrequent motions of the head ; the eye-sight failed. At a quarter past eleven, the irrepairable loss which we have sustained took place."*

I have marked with italics, the most important parts, and I now beg to draw the reader's attention to the same, as being circumstances of the utmost importance in the history of the epidemic, and as illustrating every remark that has or will be made, in these pages, upon the disease.

First then, the report states that—

" Marshal Diebitsch had felt himself unwell on the morning of the 29th."

Here is the morning again obtruding itself upon us, the commencement as I have already remarked of the natural fever of our lives, determining and ruling the development of disease. At the commencement of this natural fever, Marshal Diebitsch found himself unwell ;—but as the day proceeded, the natural overcame the febrile diathesis, it threw off by perspiration the morbid particles, and again resumed its healthy tone.

The hour of invasion is not particularized, but the word *morning* is sufficient in this instance for all useful purposes ;—there can be no doubt that the symptoms had as usual commenced at an early hour, with the nature of which the Marshal being unacquainted, and not seeing their importances, failed to mention them to his Medical Attendant, and they are consequently omitted in the case. And this is exactly what occurs in almost every instance of quotidian fever, (as this of Marshal Diebitsch's was on the 29th) the premonitory symptoms are not at all considered, because they give no trouble, on the contrary often at the time give relief to the distension of the bowels, by a copious discharge: of the crapulent contents thereof, which have more or less disturbed the functions of both mind and body during the greater part of the hours of the night. Relief being obtained, the individual falls asleep, but rises not with a continuance of the diarrhœa, but with a condition of the system directly the reverse, in other words a febrile movement in the arterial system, with chills, headach, and dry skin,—which may either quickly 'blow over', in a copious perspiration, or run on, increasing in severity, into the severest and most complicated type of typhoid bilious remittent.

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* Account by General Count Tall.—Hawkin's on the cholera in Russia.

In Marshall D.'s case, it 'blew over,' and he was well the rest of the day.

Now, had his physicians been aware of the consanguinity of ague and cholera, they could have told the patient that he would, in all human probability, have another attack on the revolution of the corresponding period; they would have seen that he had not '*eaten*' (as in health) till this revolution was accomplished; and they would have given such medical and dietetical directions, as would have prevented the return of the paroxysmal diathesis.

These precautions were not taken, and the febrile diathesis returned on the revolution of the corresponding natural period, and we find it accordingly mentioned that '*about two o'clock in the morning the patient suddenly felt indisposed.*'

This was the same febrile diathesis as the preceding day, assuming a severer form, and putting on the features of the quotidianus cunctans, or febris subintrans, which, when they occur, always indicate an increased intensity of epidemic constitution.

From the moment of this second attack, therefore, there was an aggrevation of all the symptoms; yet the patient had evidently been in hopes that it would have subsided in the same way as the preceding attack, and did not therefore apply for aid till some time after the accession of symptoms. These continued with unabated violence, notwithstanding the strong inclination of the system to throw off the disease, as displayed in the presence, of one of the most favourable symptoms that can possibly occur, viz. a superdevelopment of the febrile diathesis, in other words, a recognizement of pyrexia amidst the host of choleroid symptoms. This is pointed out by the following, which occurs in the history of the case '*and the patient suffered only from the alternate fits of shivering*, &c.' a rare symptom in the collapse of cholera, but a favourable one in all stages of the disease, in as far as it points out the remediability of the prevailing symptoms. Having experienced this shivering myself, I am enabled to speak regarding it, which, otherwise it is evident, I could not possibly have done, or even presumed to do.

The unfortunate death in the case before us, affords an opportunity of pointing to the apparent cause thereof, and which will be generally interesting more particularly as connected with the illustrious individual in question who fell a sacrifice to the epidemic. This I shall do very briefly, by simply referring to the treatment employed.

The first measures had recourse to, were venesection and leeches, so far good; but the next, the application of *very strong friction* was, on the other hand, equally bad. This very strong friction drives the blood towards the heart and lungs with a force, the intensity of which is little dreamt of by those who pursue the measure. The blood accumulates in the most important organs, it cannot pass through the lungs, and occasions the oppression and difficulty of breathing, demanding again the application of the lancet.

If there is inflammation in any of the internal organs, this driving of the blood inwards will be as equally injurious, as in cases where there is simple conjestion in the venous system.

Independant of this evident effect, there is another no less injurious one, viz., exhausting the patient, which any one can put to the test by having *strong friction* applied to his own extremities: he will not be long in requesting a cessation from the experiment, as annoying, irksome, and exhausting.

This case also illustrates the fact to which I have in various parts of the work adverted to, that venesection, although it will relieve inflammatory superadded symptoms, yet will not cure the original disease, or indeed even remove the first as long as the last remains.

In fever and dysentery the same mistaken veiws have been entertained regarding the effects of these remedies, in confounding the superadded symptoms with the disease itself. I have alluded to this in various parts, more particularly where I have pointed to the general principles of the cure in fever, and illustrated the same by a reference to that severe epidemic, which occurred in India, in 1817, and which received different names at different places, such as the Nagpoor fever at Nagpoor, &c. &c., where it was found that bleeding, no matter how, when, or to what extent, *entirely* failed in the cure of the disease: the mortality was great and unprecedented.

In cholera, bleeding will fail upon similar principles, and though, as I have said, it will relieve inflammatory symptoms, it will not remove the disease itself: for instance, the paroxysm of fever will be relieved by venesection, but, on the revolution of the periodical term the paroxysm will again return, though perhaps diminished in force and violence.

Now these remarks are made for the useful purpose of illustrating the case before us; the question, however, will naturally occur to the reader, "what was to be done?" I will only ask the reader, if, after venesection and leeches had failed, it was likely that the symptoms, increasing in severity, would be relieved, or life saved by *strong frictions?*

In a case of poisoning (for the sake of example) from corrosive sublimate or arsenic, would the application of strong frictions, remove the pains, spasms, and convulsions which venesection, or leeches had failed to relieve? Certainly not. We would attack and disarm the powers of the first by the administration of a sufficient quantity of albumen, and the second by the tritoxide of iron, which is said to be an effectual antidote.*

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* See last number of the Journal of the Medical Society of Calcutta, for a successful case, by Dr. Murray.

Now the active principle of the epidemic constitution has not hitherto been discovered, nor have the nature of those changes in the primæ viæ been sufficiently investigated to disclose the particular character of the morbid principle, but there is sufficient presented to the naked eye, in the symptoms of the disease, as not to admit of the merest suspicion of doubt, as to the contents of the bowels acting the part of a poison on the system generally, and on the mucous membrane of the primæ viæ in particular, in the induction of discharges therefrom, and of irritation, inflammation, and mortification. Such is the resemblance of the symptoms in cholera to those from artificial poisoning that not the slightest difference can be distinguished between them in many cases, and the occurrence of the disease in the epidemic form is the only sure criterion of its not being the result of artificial agency: and such is the general similitude of the two that the popular opinion has given itself vent in the ebulition of frantic fury, (under the conviction that the water of the wells and rivers was poisoned by hired assassins) and, in their paroxysms of rage, they have murdered whomsoever they encountered. Innumerable instances of this are on record, and, within these few months, a melancholy one has occurred at Palermo, where an Englishman was literally torn to pieces, the victim of this popular indignation.

It is, therefore, singular, (even waving the corresponding symptoms of the disease,) that this universal idea has not been followed up in the treatment, by the application of those means best calculated to REMOVE whatever keeps up the irritation in the stomach and bowels.

I do not hesitate to say that the oversight of this method of treatment has been the cause of the great mortality in cholera, the cure of which has all along been attempted by a blind adherence to particular remedies suggested by theoretical opinions, and not by the universally prevailing character of the epidemic.

Venesection was suggested by the inflamed appearance of the intestines; but the enquiry stopt here; and it was never conjectured that this inflammation must have proceeded from a cause which venesection could not remove, although fatal cases were daily occurring where the remedy had been fully tried, as we here see it was in this case of Marshal Diebitsch. The obvious indication, therefore, is the employment of such means as will assist nature in her own endeavours to expel the irritating contents of the stomach and bowels, and which can only be done by the most simple remedies which, while they dilute the contents of the tube, will likewise, from their quantity, enable them to be carried down and discharged by stool.

To illustrate the principle by familiar example, it is only necessary to refer to the operation of medicines which produce pain and griping till they are discharged, and that this is effectually determined by large draughts of diluents. No one would ever think of taking a dose of salts, without following it up with free dilution, because common sense informs him that the medicine will not otherwise be effectually carried down along the tube. Yet common sense has never suggested a similar and corresponding principle of treatment in epidemic cholera to assist nature in expelling what she finds annoying the lining membrane of the bowels. On the contrary an opposite mode of treatment has been adopted, and stimulants and irritants of every description administered. It is scarcely needless to say, that this last class of remedies can neither thin the blood nor remove inflammation of the stomach and bowels, and therefore they need not be adverted to in the consideration of the

TREATMENT,

on which I will now enter.

From the repeated references that have been made to the disease on every subject connected with it, and particularly the treatment in allusion to the physiology and pathology, the reader must have himself perceived the obvious plan that should be pursued, and therefore its consideration will not occupy long, since it may be deduced from the general tenor of the essay. We will suppose then, an individual rises from sleep with a feeling of general uneasiness or *restlessness*, and distension more or less of the stomach (or abdomen generally), and that epidemic cholera is prevailing at the period in question, we may safely conclude that he has imbibed the febrile constitution; that the consecutive stages of diseased action are establishing themselves; that chylification has been interrupted; that the distension points out an *unnatural* condition of the nutritive apparatus; that this unnatural condition is acting on the expansion of the pneumogastric and phrenic nerves in particular, and consequently on the accessory nerves parts of the same, inducing that sighing, and leaning forwards on the hands to assist the expansion of the chest; that the sympathetic and par vagum being equally involved explain the weakness of the pulse and the collection of the blood more and more in the venous systems.

Inquiry of the patient informs us that he retired to rest in health after a hearty meal. Connecting this with the sensation at the stomach, and the consequent physiological train of *nervous* symptoms, the inference is irresistable that the process of chylifiaction has been suspended, and that the unassimilated aliment is inducing irritation of the mucous membrane of the stomach and duodenum. The obvious indication, therefore, is its speedy removal, by the exhibition of emetics with *copious* diluents, before it has passed down into the small intestines. If the matters are *completely* ejected by vomiting, *there is an end of all danger.* I have never known a fatal case where this has happened. The moment a fit of vomiting is over, or if the patient has breathing time during the paroxysm, he should be freely supplied with diluents, of which he will invariably as freely partake. The medicine which induces the quickest vomiting when the stomach contains aliment, is the bi-carbonate of soda; it is mild in its effects, and particularly indicated in the disease. It does not act as an irritant on the mucous membrane, but chemically on the contents of the stomach; carbonic acid being disengaged, and the stomach excited to expel the indigested mass, which it was fruitlessly endeavouring to dissolve.

It may be given in any quantity, and the larger at the very onset the better. I do not consider it necessary to particularise the different emetics; my object is the display of the principles of treatment; should others be chosen the mildest and most efficacious must be selected, that no additional irritation may be contributed thereby.

Relief being obtained in the most important part (the stomach), the attention must next be directed to the inferior portions of the canal; in these, the patient complains of griping or occasional twinges more or less in the right or left colon, and accompanied by corresponding spasms of the right or left foot, or leg, according as the right or left colon is irritated. Now it is obvious that, if the spasms of the right leg follow the twinges in the right colon first, and then, spasms in the left follow twinges in the left colon, I say, seeing these what other is the obvious conclusion than that there is an irritation in the canal caused by matters passing along, first affecting the right side, then, as it passes off by stool, affecting the left, inducing the spasms in the corresponding extremities. The irresistable conclusion is, that these matters must be removed before relief can be obtained, on the same principle that the contents of the stomach were removed for the relief of the irritation in that particular part. Now, as the system may not have a sufficiency of fluids to work these off itself, it must be supplied with them, and they must be of the mildest and at the same time the most efficacious. The addition of the vegetable acids to the carbonate of soda, affords the readiest and most useful of any that can be found. Having taken it myself for the cure of the disease, I can speak as to its specific efficacy; nor would I have dared to recommend any medicine in such a disease had I not *solely and fully* relied on its efficacy in my own case. I took it without any regard to quantity, entirely influenced by the desire to quench the burning thirst by means which would at the same time gently (and *imperceptibly observe*) remove the irritating matters from the whole intestinal canal The satisfation to the mind, while swallowing the cooling beverage, was extreme, in knowing that the very next minute I could repeat it if necessary; and this was the case, for I swallowed the cooling draughts as quick as they could be made. The spasms grew less frequent, and as the last remains of the alimentary matters were passed off by stool, the spasms also passed off from the toes of the left foot. I soon fell into a profound repose, which lasted several hours, and I awoke, I may say, perfectly well. Notwithstanding the quantity of acid and alkali I had taken, my bowels were not moved; and notwithstanding the quantity of water (being at least two goglets full) I had drank, I felt thirsty; I had perspired profusely however, all which tends to show how much nature will herself affect, if she have the means afforded. I did not pass by stool more than a quarter part of the water drank, what then became of the other part, amounting perhaps to 10 or 12 pounds? Let the reader turn to the physiological parts of the essay, particularly to the head FEVER, and its treatment, and he will find the key, and having taken this key, he will find the view will be opened to him. He will perceive that cholera is the epidemic fever turned in upon the bowels, that the corruption of the aliment draws for a time that fever still more inwards, but that on this last being expelled, the epidemic fever mounts to the surface, there to be thrown off though the pores of the skin; that, if the blood is thick and viscid, it cannot flow to the surface, and therefore he will perceive that, if it is liberally supplied with fluid, it will flow freely and purify itself in the natural way by perspiration; and he will hence understand that the water I drank entered the blood, and was thrown off during sleep in the copious perspiration I have alluded to.

I was neither bled, salivated, opiated, or injected, because I reasoned on the nature of the disease in the manner I have described.

Books I found directed bleeding, and calomel, and opium; but I could not see how calomel, and opium, and bleeding could remove the putrid stools that were passing off; they would rather, I thought, tend to keep them in the bowels where they were already causing pain and spasms. Reasoning in this way, I called for the effervescing draughts, determined at least to treat myself upon some principle I could understand which was not to die with my stomach and bowels full of offensive fluids, and my tongue cleaving to the roof of my mouth, but, on the other hand to quench the burning thirst, and, at the same time, gently remove the irritating contents from the stomach and bowels.

Treating myself on this rational principle, the reader may believe how gratified I felt at its results, as, when the symptoms first showed themselves, I surveyed with despair all that had been written regarding the disease as imparting no distinct negative or affirmative facts which could lead to a rational principle of cure, universally applicable as the disease itself was universally prevalent.

The principle I have described, I thus in despair accidentally adopted ; and, in the sound repose that followed its success, I forgot opium, calomel, and the lancet, and a long list of other adjuvants which had all been spread out on the table before me.

I have already adverted* to the universal applicability of the treatment above described, and to the bounty of Providence in furnishing in abundant profusion the means necessary for its adaptation.

Even in the most unhealthy localities, which are often encountered on a line of march, or encampment, where the water is replete with swarms (or rather clouds) of animalculæ, the solution of the fixed air instantly destroys them. We will suppose for instance, that on a line of march, miles from any habitation, a number of men are attacked with cholera, and that the only water procurable is a moving mass of animalculæ ; to allay the ardent thirst, and to follow up the principle of treatment described, it is evident that the water must be freed from these, and singular enough the very substances indicated in the treatment are the very ones which afford that which is instantaneously a poison to them, but a refreshing invigorator to the sick. At a moment's notice the draught or draughts, in any quantity, can be prepared, all that is necessary being merely filling a vessel nearly with the water, throwing in the acid and alkali, securing the opening and shaking for half a minute, when the whole of the living atoms will be destroyed.

Animalculæ that will survive in strong acids, and in nearly pure spirits, immediately tumble to the bottom in the effervescing draught.† I was long in despair of finding a congenial and ready procurable destroyer of the tenacious lives of these germs, and which would *at the same time* render the water a wholesome cooling beverage, till I accidentally hit upon the foregoing as fortuitously as I did upon the treatment of the disease in my own case.

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* See Preface, and other parts.

† By inverting the vessel for a few minutes, the animalculæ will subside, when, by loosening the cork, the pressure of the gas will force them out.

I have here, therefore, given a case of simple cholera which occurred to myself. The most important circumstance in every case to be ascertained is the quantity and quality of aliment received into the stomach at the last meal, and the quantity of the same returned by vomiting; exactly, invariably, and never failing is the danger in proportion to the quantity retaining in the stomach and bowels. In my own case I vomited up every thing (nearly) that I had eaten several hours before.

Those who do not vomit their last meal, especially if not long eaten, almost invariably perish. This corresponds with what is observed in poisoning. Morgagni, in his great work on the seats and causes of diseases, states that at an Italian feast the desert was purposely sprinkled over with arsenic instead of flour. Those of the guests who had previously ate and drank little, speedily perished; those who had their stomachs well filled were saved by vomiting. He also mentions the cases of three children, who ate a vegetable soup poisoned with arsenic. One of them who took only two spoonsfull, had no vomiting and died; the other two, who had eaten the rest, vomited and got well.* It will be perceived, therefore, how universal the principle is that I have endeavoured to illustrate. The insinuation into the small intestines of the contents of the stomach in cholera will at once demonstrate the necessity for the exhibition of copious bland diluents to assist the passage of the materials through the intestines, since while they remain there, the disease will not be cured. Hence we perceive bleeding and every other remedy fail that has not this effect.

In Marshal Diebitsch's case it will be perceived, that after the first day's or morning's illness he ate as usual. This was the cause of his death. Had he known the nature of cholera, that it was the epidemic fever turned in upon the bowels, he would have allowed the periodical revolution to have been completed; instead of clogging the wheels of the machine, he would have lightened them and urged them on past the dangerous period.

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* Ure's Chemistry.

I have already explained, in referring to his case, the treatment that should have been adopted, especially after it was found that venesection would not afford relief. His case, with many others indeed, but too plainly show the empirical treatment of the disease all over the world, the result of the extraordinary features it has presented, not of want of skill on the part of the attendants. The failure of venesection in this instance clearly and incontestably points out its inefficacy to relieve in the worst cases, because here were all appliances and means to boot, yet death was the result: had it only afforded temporary relief it would have been something to say for it, but no! the patient sunk in 8 or 9 hours from the second attack. The attendants not perceiving the nature of the pestilence, were not aware that Marshal D. had been under the epidemic influence at least thirty-six hours, they accordingly did not treat him for the febrile diathesis, but simply for the developed symptoms, which are distinct and separate from the constitutional affection in this as in other diseases. Hence we perceive cases of cholera in which there are no secondary symptoms, and others again in which there are many.

I have pointed throughout the principles of treatment in the pure uncomplicated form of cholera: however diversified the remedies employed, they must, to cure the disease effectually and prevent inflammatory secondary symptoms, be of such a nature as will effect it after the manner I have described.

I will now say a few words on those *cases of cholera requiring abstraction of blood.*

Many individuals have been bled in cholera who never required it; and many have died after free venesection, as for instance Marshall D. to whose case I have just referred; it is evident therefore that it must be practised under certain circumstances to insure success; and not used indiscriminately as recommended by many. To insure that success it is perfectly clear that the irritation and inflammation must not be kept up in the stomach and bowels, as in the case of Marshal D., by irritating matters resting in them, because every drop of blood in the body might be drained without having the effect of removing these substances from the stomach and bowels.

The cause of the mortality in cholera has originated in a great measure from having lost sight of this and trusting to venesection and doses of calomel and opium. Venesection even to fainting, with a pound of calomel, will just as soon relieve a case of poisoning where the small guts are full of arsenic, as they will in the case of cholera where the same parts are full of unassimilated matters. When these matters, or the arsenic, have been removed, then will venesection be of essential service in relieving the parts that have been left inflamed.

Trusting to one set of remedies therefore has been the stumbling block in the treatment of cholera, these remedies having been applied to all forms and varieties of the disease. I have pointed out the only rational mode of treatment in the first instance without the observance of which venesection will be a failure. *If the first object is held in view,* the second, the abstraction of blood, for the relief of pain and spasms, may be carried with advantage to any extent.

If the pain of bowels and spasms of the legs continue after the exciting cause has been removed, leeches *in abundance* and *constant fomentations* are required on the inferior region of the abdomen. If in the upper extremities, on the superior portions of the abdomen. These being accompanied by general abstraction of blood.

There is another circumstance of frequent occurrence in cholera which demands venesection for its relief; that circumstance is the obstruction to the circulation of the absorbents, the outlets of which vessels are dammed up by the thick blood collected in the venous system distending it with great force, so that the lymphatic fluid cannot enter and therefore cannot thin the blood.

While this effect is produced there are also several others; weight and oppression in the chest; drowsiness, and partial stupor; profuse clammy sweats after each fit of vomiting and spasm (as already explained); blueness of the surface; all resulting from the blood being too thick too pass through the lungs. By abstracting some of this blood, therefore, the pressure upon the opening of the thoracic and lymphatic ducts is relieved; the lymph flows on towards the heart and lungs dissolving the clotted blood as it passes along. The moment it has reached the lungs the passage of the blood to the left side side of the heart begins to take place, and the pulse is re-established.

The nearer the heart the bleeding is practised so much the better; the pressure taken off the venous column is immediate, direct, and general. As the blood flows out the lymph flows in towards the lungs, as already described, and absorption from the base of the venous cone takes place. This last is well seen in bleeding at the arm; the blood changes colour and flows till the fluids of the part are expended. (This changing colour is important as pointing out the influence of the pressure of the venous column preventing absorption, and consequently producing those forced, clammy perspirations, after each attack of spasmodic retching.)

Whenever venesection, in fact whatever treatment, is practised in this disease, the principle that I have described must be rigorously kept in view, the importance of which will be appreciated by the perusal of the physiological remarks in reference to the expenditure of the secretions, the consequent destruction of the process of assimilation, and the viscid state of the blood the result of the deficient supply of nourishment.

The deficiency of the alkaline diathesis in cholera is at once pointed out by the absence of the biliary secretion; and as, in health, the primæ viæ is little else than an alkaline receptacle, the necessity in cholera of supplying the deficiency of that principle is clearly indicated. Alkali is the natural lining of the primæ viæ, its absence therefore must be unnatural, or a disease, the removal of which will take place on supplying the alkaline principle.

The mucous membrane of the colon in a state of disease or ulceration throws out an alkaline principle; and, if the lower portions of the tube in cholera exhibit an alkaline reaction, it is no proof that an acid reaction will not be exhibited in the upper portions; it is no proof that that alkali is from the bile, for on examining the liver there are few if any traces of that fluid, or in other cases it is found (but thick and viscid,) in which state it is evident it could not have flowed.

Independent of this deficiency of alkali in the alimentary tube, I have also shown* that the viscidity of the blood follows the deficiency of the alkaline diathesis; and pointed out the effects of alkalies in dissolving the same completely, as seen when diffused in distilled water.

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* See Introductory Preface, and various other parts of the work.

The conclusion from observing the condition of the primæ viæ, is irresistible that the alkaline diathesis is deficient, and that it must be restored to effect a cure. For this purpose nothing can surpass aqua ammonia, which should be given in repeated doses in large solution, regulated by the feelings of the patient. In the absence of ammonia (which need never be, as it is so easily procured), the aqua soda or aqua potassa are equally easily procurable, and nearly as efficacious.

The presence of carbonic acid in the small intestines in cholera is often a source of extreme irritation and inflammation. It is the produce of the decomposition of the alimentary matters. Ammonia combines with this, and instantly destroys its poisonous qualities. The effects of carbonic acid on the mucous membrane are perceived when taken into the stomach; it is agreeably stimulating at first, but, if not expelled soon, becomes a source of irritation; the individual rubs his stomach, opens his throat, and tries all manner of ways to expel it.

The effects are also seen, on taking carbonate of soda on a full stomach, the gas is extricated and produces three effects: first, it distends the stomach; second, it stops digestion; and third, it produces irritation and destruction (if in excess) of the inner coat of the stomach. This last effect of the gas may be experienced in several ways; for instance, let some of the carbonate and acid be well rubbed on the hands moistened with water; a sensation like needles running into the skin will be experienced. Or if a portion of the same substances be rinsed in the mouth, there will be a discharge of blood from the whole internal surface; and the whole will feel sore and tender, and bleed on the least motion of the tongue.

Ammonia combines rapidly with the gas and prevents its poisonous effects. So does lime water, the efficacy of which depends greatly on this; and hence these two substances being so universally procurable should never be absent in the treatment of cholera.

It has been said that hydrocyanic acid has been discovered in the intestines after death in fatal cases of cholera. I am not aware that those who discovered it have recommended ammonia, but it is said to be an antidote to this virulent poison.*

We perceive, therefore, that there is no end to the good qualities of this powerful substance when properly administered, and there may be many more that have escaped my observation. I may enumerate those already related, viz. antacid, antiseptic, a solvent of the albumen of the blood, rendering it consequently of less specific gravity, and restoring its fluidity, combines rapidly with carbonic acid gas, thus reducing the tumefaction of the abdomen, and removing irritation; and is an antidote to, or counteracts the effects of, hydrocyanic acid. In addition to all these, when properly administered it is also a diffusible stimulus, assisting in the development of the arterial diathesis, that condition contrary to the choleroid or venous; combined with distilled water, its properties are all increased, and the water rendered of less specific gravity. It reduces calomel and enables the specific action of mercury to be exerted on the system (should this be an object), and it restores the natural alkaline diathesis of the system, altogether deficient in cholera.

It is satisfactory, therefore, to survey these known effects of this useful medicine in connection with the disease under consideration, and particularly when in combination with water. All these are rationally and physiologically explained.

But how different with the multitude of specifics advanced as cures for the disease, they are involved in a cloud of doubt and obscurity; and the mind is bewildered in contemplating the confused assemblage of contradictory and opposing properties.

It must be recollected that the efficacy of these remedies depends upon the distance they travel down the tube in the first place, and this they cannot do without large dilution; and in the second place their efficacy depends upon their speedy absorption along with the diluent, which of course will take place in longer or shorter time according to the extent of surface to which they are applied.

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* When we recollect, however, that prussic acid is one of those poisons which retains its destructive properties in all its soluble combinations, we cannot repose any confidence on ammonia as a *chemical* antidote, though we consider it of the utmost value as a powerful diffusible stimulant, by which the narcotism induced by the acid is opposed. The second remedy, chlorine combines high chemical and physical powers; by the first it decomposes the prussic acid, and prevents its doing further harm, while by its stimulating properties, it contributes to obviate the effects the poison has already induced. —*Manual of Chemistry by Dr. W. B. O'Shaughnessy.*

The importance of these alkaline remedies in the treatment of cholera has induced me to give the method of readily preparing* them on the spur of the moment, and sufficient for every purpose required. The demand for which, if they are properly appreciated, would be such, on the visitation of the epidemic in a severe form, that no ordinary supply, from without, could meet it.

While I have therefore pointed out the principles to be pursued in the treatment, I have also pointed out the reason why these principles are indicated, that all may understand; and no medicine henceforth need therefore be given on empirical principles. I have endeavoured to assist in drawing forth the disease from the obscurity in which it has been involved, that the form and features thereof may be exposed to general view. The hitherto mysterious character of the hydra will be divested of its horrors, and in advancing to attack it we will now know the ground on which we tread. I lay claim to no credit in these humble endeavours to be of use; for I have merely laboured to revive the neglected doctrine of natural therapeutics. I have attempted to describe the features of the disease in language that may be generally understood, that, by a general knowledge thereof, this universal malady may be successfully combated: a strict adherence to technicalities would have bewildered the *general reader*, and he would have risen from the perusal of these pages as wise as he was at first.

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* The aqua sodæ † and aqua potassa † can readily be prepared in any quantity by mixing the carbonates of these alkalies in solution with excess of fresh burnt quicklime and pouring off the clear liquor, and filtering the residuum. The aqua ammonia can as readily be prepared from sal ammoniac (nowshader) and fresh burnt quicklime (chuna) made into a paste with water and mixed. A goglet, a piece of a hookah snake, and a bottle of distilled water cold, being all the apparatus necessary on emergency, the gas comes over on the application of heat.

† The preparation of carbonate of soda is given in another part. The following simple method of preparing the carbonate of potash (jhar ka nemuck), is here given from Dr. W. B. O'Shaughnessy's Manual of Chemistry.

"Melt saltpetre in an iron pot, and gradually add powdered charcoal until it ceases to take fire. The nitre is decomposed, and carbonate of potash formed; by washing with water, filtering through cloth and straw, the greater part of the impurities are effectually removed."

In reference to these alkaline remedies, to which I have just adverted, he will perceive their indication in the total absence of the biliary secretion in the bowels; in the presence of acidity in the early stages, and the consequent formation from their exhibition of neutral harmless salts. In the combination with copious diluents he will perceive their indication in the viscidity of the blood (causing the stoppage of the circulation), and in the property of the albumen of the serum dissolving in them.

All these save the last have been rendered obvious by the physiological observations, and this too can be demonstrated by trying their action on the albumen of the egg; this will be dissolved and a *transparent* solution produced; and even if the albumen is precipitated again (by corrosive sublimate for instance), the whole will again become transparent on the addition of the volatile alkali.

The exhibition of ammonia has been attended in the worst cases of collapse (after the abstraction of six or seven ounces of blood) with the most beneficial effects; all recovering to whom it had been administered. The composition and powerful penetrating character of this gas may help, in addition to what I have said, to explain its wonderful effects. I am not aware if, in these cases recorded, calomel was given along with it: if so the reduction of the salt would be a natural consequence (*See the remarks on the action of mercury.*) It is singular that this powerful agent (I do not mean as a stimulant) has not received more attention than it has in the treatment of cholera. In the cases recorded it appears to have been given as a stimulant, the throat suffering afterwards.* This principle is not according to the physiology of the disease, I have endeavoured to describe, which indicates the exhibition of alkaline diluents. I cannot repeat too often the benefit of avoiding every remedy which irritates or nauseates, or annoys in any way after the stomach has been emptied of its indigested matters.

Opium (muriate of morphia) is inadmissible in congestions when the blood flows not through the pulmonary tissue.

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* Dr. Steart, Dr. Mottley I. J. M. and P. S. Calcutta, 1833.

It is also inadmissible when the stomach and bowels contain unassimilated matters producing high irritation ; if these are removed in the manner I have described, sleep follows fast without any assistant.

Opium is a valuable remedy in any irritability of system that may continue after the violence of the disease is passed : combined with the spiritus mindereri, or the common effervescing draught, it is nectar to the nerves ; in this diluted state it reaches down the tube, is taken up by the vena porta conveyed partly to the liver (for the secretion of bile),* and also over the whole system ; its application to the whole nervous expansions on the mucous membrane also unables it to exert its specific action in the most effectual manner, and in the least possible quantity.

Strychnia with copious diluents has been attended with surprisingly beneficial effects.†

The strychnia was given in 1-12th gr. doses. The effects of this treatment appears to me to have been owing principally to the diluents, as the strychnia by itself could never have restored fluidity to the blood.

Cold water as a diluent invariably successful. This is Dr. Shute's system; Dr. Bodington, Dr. Degraves, Dr. J. Wilson, and many others tried it with complete success : the latter gentleman having lost his patients under the stimulating system, had recourse to the above plan, and saved all his patients afterwards ; he allowed the patients as much as they could drink, and used injections of the same, and removed inflammatory symptoms of the stomach and bowels by leeches.—*Lancet*, 1831-32.

The *Lancet* says, " a great number of documents for our inspection by the Central Board of Health, concur in speaking, in high terms, of the unlimited permission of cold water in the stage of collapse."—*Ib.*

At Berlin the same plan, with *cold affusion*, was the only successful treatment.—*Ib.*

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* Dr. Jenkins' Lancet.

† See preface, and section " Ague".

The reader, if he consults Sydenham, will find the above plan of diluents in cholera detailed: an acquaintance with his works would therefore have introduced the treatment at a much earlier period.

Sydenham, in recommending diluents, condemns at the same time cathartics, or opiates, or astringents, as injurious. Sydenham's diluent was water in which a chicken had been boiled, so that the water scarce tasted of the flesh; a chicken was boiled in three gallons of water; injections of the same were also given.

Dr. Swan, the reviser of Sydenham, states—"Cold water is esteemed an excellent remedy in a cholera, and is said to be so much the more effectual, the warmer the climate, season, and constitution of the patient be. It mitigates and takes off the violent heat, *dilutes* and blunts the acrimony of the humours, &c."

Distilled water should form the diluent, whenever practicable; it is as easily prepared as the water itself is readily procured. Its solvent powers are fully developed, and it permeates the tissues with much greater rapidity than when loaded with impurities.

Sponging the surface with water is as beneficial and agreeable to the sick as the refreshing beverages of the same. The fluid speedily penetrates the shrunken tissues; while the vapour, rising, forms an atmosphere round the patient, and enters the blood through the pulmonary organs. It allays that extreme restless jactitation and sensation of approaching suffocation, arising from the dryness of the bronchial passages, and difficulty of the thickened blood passing to the left side of the heart.

The exposure to the influence of the atmosphere should never be omitted; many are suffocated from being covered up and surrounded by numerous attendants; neither nitrogen is admitted to the surface, nor oxygen to the lungs, and all chance of benefit from the aqueous vapour of the atmosphere is entirely lost. In another part I have alluded to the benefit of exposure, having seen hopeless cases, exposed to the night air, on a line of march, recover: these tossed off all covering as irksome and distressing.

Covering up with thick blankets; and hot applications to the extremities, are all a mistake in cholera, as long as jactitation and restlessness, and a longing for cool air, are present. These are the natural instincts expressing their desires; they should be met by a corresponding treatment.

Injection into the veins in cholera, I have already alluded to in several places; I will therefore here only give the following extracts in connection with the same subject, as showing the effects of the same *in other instances* both in Europe and India.

"The experiments made by Mr. Magendie of injecting a fluid into the veins resembling the serum, proved ultimately inefficacious, although the disease had in some been for a short time modified." —*London Medical Gazette.*

"Dieffenbach of Berlin drew off the blood of cholera patients, and replaced it by the transfusion of blood from healthy persons; but this, which might have been justifiable, failed in every case."—*Medical and Surgical Journal.*

At the European military hospital at Dinapore solutions of carbonate of soda have been injected into the veins of cholera patients, but without any permanently good effect. The revival, however, which it at first produces, is very remarkable. The patient, a few minutes after the introduction of this salt into the blood, looks up like a new man: so great is the change, that he appears comparatively well. But this alteration is not lasting: in the course of two hours he again flags, and, notwithstanding the injection, is repeated over and over with a corresponding temporary success; the patient each time suddenly reviving, is yet all the while gradually growing weaker and weaker, and eventually expires.—*Spry's Modern India.*

Dr. Meikle M. E. tried venous injection; he found the revival, following it, again suceeded by collapse: he relates a cure where 612 ounces were injected.—*Lancet, vol.* 2, 1831-1832.

"Tobacco injections and draughts of carbonate of soda were attended with pre-eminent success in the treatment of the disease by Dr. Hazzlewod and Mordry."—*Ib.*

The ratio operandi of these rests principally on dilution; the injection is rapidly absorbed by the vena porta. The draughts of carbonate of soda dilute and blunt the acrimony of the contents of the primæ viæ.

Muriate of soda was at one time in high repute; it has fallen into disuse, having been abused. Instead of increasing the quantity of water and diminishing the quantity of salt, the reverse was done, and the object was lost. It was rendered too harsh a remedy, irritating the throat, œsophagus, and stomach, and precluding its admission in the worst cases of collapse where even the mildest fluids can scarcely be swallowed.

Instead of the strong solution in which it was given, the diluent should only partake sensibly of its qualities, and the former will thus be also rendered an agent for allaying the urgent thirst, at the same time that it exerts the influence I have already adverted to when treating of the object to be had in view in the treatment.

Sydenham's diluent acidulated with the muriate of soda surpasses all the boasted nostrums and other remedies that have been advanced as cures for the disease.

Small portions of muriate of soda, added to the effervescing draught, might increase its efficiency, while a double advantage would be gained at one and the same time.

I tried the muriate of soda (in the way it was at first recommended to be given) in three cases of collapse; they all died.

STAGE OF REACTION.

This is the febrile movement towards the surface, the irritation in the primæ viæ, having been in excess, had prevented its development, but that being removed or lessened, the epidemic is displayed in the repletion of the arterial system.

In Russia this stage was often devoloped in its true form; Drs. Russell and Barry informing us that it could not be distinguished from the ordinary continued fever.

In cases where the contents of the bowels have been gently assisted in their expulsion from the system, *and their place supplied by diluents*, the re-action is not perceptible, sleep succeeds, and a copious flow of perspiration takes place.

But in those cases where the contents of the tube have not been all discharged, then either violent irritation and disoraganization of the tube follow, or else, where the irritation is not so severe, these matters are absorbed into the circulation, giving rise to the full development of the febrile diathesis.

Now the whole principle of treatment of this stage consists in following nature as closely as possible, that is, in imitating the diurnal revolution of natural fever as brought about by the operation of nature herself. For this purpose we have only to recollect what daily becomes of the ingesta; what is the proportion thereof discharged by transpiration, and what passed by stool, and, having observed these, follow them closely in the endeavour to depurate the blood.

APH. VI.

Now "if eight pounds of meat and drink are taken in one day, the quantity that usually goes off by insensible perspiration in that time is five pounds."

APH. LIX.

"Forty ounces are generally discharged by perspiration in one night; sixteen ounces by urine, four ounces by stool."

APH. LX.

"There is as much carried off by sensible perspiration in one natural day, as by stool in the course of five days."*

If such is the process followed by nature as indispensably necessary for the continuance of life, how imperious must the necessity be of assisting her in this operation, in the diseases under consideration, where there is a deficiency of fluid, and where the blood is more or less viscid.

If in the above fever the blood is minus 100 ounces of its aqueous portion, it is perfectly clear that it must be supplied with these before the disease will give way; and it is therefore obvious that this can never be effected by purgatives, the exhibition of which, in these asthenic epidemic fevers, is in direct opposition to the natural laws of the system.

The effect of discharges by purgatives is to render the blood thicker than it was before; and the heat also, which would have been carried off by transpiration under the natural system of cure, is retained in the system and exasperates the disease.

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* Sanctorius.

APH. LXI.

"What then must be thought of those physicians who, in all manner of distempers, have regard only to what is evacuated by stool and urine, and never take any notice of the discharges by *insensible* perspiration?"*

The whole system of cure is plain, evident, and intelligible. If we find that, in the development of this fever, the brain, the chest, or the abdomen suffer from the insinuation, into the minute structure of their viscera, of this ill conditioned blood, and that it is there stagnating and forming obstructions (the nuclei for impending confirmed disease), it is clear that general and topical abstraction of blood affords the only chance of immediate relief. But, while this is so clear, it is no less equally so that the abnormal condition will return at the stated revolutionary period, unless the blood is improved in condition before that time; and that this last can only be affected by the restoration of the healthy chylifactive and nutritive process along the whole alimentary tube.

This, however, cannot be established except through the blood, and if the blood have no fluid to form those secretions necessary for the assimilation of the aliment, it is clear that the whole machinery of the system must be at a stand; in other words, the patient sinks in the comatose cauma of typhoid remittent, or the continued consecutive fever of cholera. Therefore the rational principle of cure is evident; which is, to imitate nature in this other case of abstracting blood from the peripheral aspect, on the same principle that she throws out her profuse perspirations from the same surface. We have therefore only to observe the nature of the secretions (concerned in the process of chylification), as existing in the condition of perfect health, and endeavour, as nearly as possible, to imitate them in those substances we administer to supply their place when absent, which, as I have repeatedly stated, is more or less the case in the whole class of these asthenic epidemics; and, in the principal one, altogether wanting; even the minutest trace of the chiefest one of all, the bile, is not to be found *in the intestinal canal.*

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* Sanctorius.

Hence the general efficacy of bitters in restoring the tone of the stomach and bowels, and in curing the febrile varieties of the epidemic, because (it is hardly necessary to say) they supply the deficiency of the biliary secretion; and were it possible to form a diluent which would be similar in its composition to all these secretions together, we would possess the long looked for panacea. Keeping this in view, therefore, the cure of the febrile reaction of cholera will be easy and complete; the diluent being in quantity will gradually pass along the tube, filling, more or less, the whole thereof, and rapidly passing into the circulation, thining and producing changes in the blood by which the transpiratory process again will be once more set a-going.

The general or topical excitement will be at once relieved by the general or topical abstraction of blood: to these I can set no limits; they are both as beneficial in relieving on the one hand, as drastic purgatives are pernicious and destructive of life on the other.

The general treatment of fever I have considered under the appropriate head, and therefore need say no more upon the subject in this place, but proceed briefly to describe the development of ague, or the shivering fit of the epidemic as it passes from the choleroid into the febrile diathesis.

I must here however point out a circumstance of great practical importance in the treatment to be known, and of which I obtained knowledge from observing it in my own case. It is this, that as long as there is a wish for cool air, or if there is restlessness, oppression, or anxiety about the præcordia, the choleroid diathesis prevails; but when the febrile diathesis begins to predominate, then these symptoms of restlessness disappear, and the individual expresses a desire to be covered up. The diluents may now be given as *hot as they can be drank,** so that the individual is obliged to drink them by drawing them up into his mouth with the air (for the purpose of cooling them); in this way the vapour enters the chest and is applied to the extensive surface of the pulmonary tissue, combines with the blood, and assists its passage to the left side of the heart; and afterwards no less promotes the process of transpiration over the whole surface of the arterial expension. The vapour of the hot liquid taken into the stomach likewise permeates the tissues with great rapidity; and when ether or ammonia have been given, the perspiration, in a short while, bursts out over the epigastric region, and soon becomes general over the whole system.

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* The patient will not refuse them at this period, it is a sign that the violence of the choloroid stage is past, and the febrile setting in. I experienced it, and can therefore speak regarding it. *Small portions* of wine or brandy may be added (if desired by the sick especially); and the draughts can be rendered palatable by the addition of sugar and a little spice,

In the case of Marshal D. it will be perceived that there was a tendency to the febrile diathesis; but the irritation of the internal mucous surface of the primæ viæ prevented its development. Had this last been removed, the former wuld have become fully developed, either in a protracted fever, or in a natural resolution by profuse perspiration.

When this resolution takes place the urine will exhibit an alkaline re-action; while, at or about the period of the collapse, it will exhibit an acid one, however slight that collapse may have been.

To recapitulate therefore, in reference to the treatment as displaying the principles to be followed, I may state that if I were attacked with cholera this moment, I would immediately have recourse to the bi-carbonate of soda and aqua ammoniæ, two scruples or more of the former with twenty drops or more of the latter, according to the strength of the same, in *a copious draught of water* to encourage vomiting. This I would repeat according as the thirst, and uneasiness at stomach, were urgent. When the stomach had ejected its contents, or if these appeared to be descending, then I would gently assist that descent, *by large and repeated draughts of the effervescing solution of the bicarbonate of soda and tartaric or other vegetable acid.*

If the spasms in the lower extremities were annoying, but not very severe, I would have the abdomen* and *loins* constantly fomented with hot water. This, I found, relieved the spasms in the legs and feet in my own case. If the spasms were more severe, and if there was any oppression about the chest, I would bleed; and if there was any fixed pain in the stomach, I would apply leeches.

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* Particularly over the region of the right or left colon, according as the cramps are worst in the right or left leg.

I would however rigorously continue the effervescing draughts confident of the ultimate success that would attend their exhibition. When the irritating contents of the bowels have given place to this fluid congenial to the mucous surface of the intestines, an inclination to sleep immediately comes on, and repose follows, without the assistance of any opiate.

I have already adverted to my own case (pages 51 and 52). The reader will find, on reference to it, the natural principles of cure applied successfully. I call them natural principles for several obvious reasons.

1st. It was no preconceived theory that made me choose the effervescing draughts of bi-carbonate of soda and tartaric acid, but merely the natural instinct which I felt urgently demanding something of the kind.

2nd. It relieves the burning thirst, the most distressing and the most constant symptom in cholera.

3rd. It is particularly soothing to the stomach.

4th. It gently travels along the tube, and carries down the putrid irritating colluvies thereof.

I have had the disease three times; in each instance the discharges were highly putrid and offensive (like meat that had been dead for several days); in every case this in the first instance occurs; the less diarrhœa, that is, the more these contents are retained in the tube the greater the danger, because irritation and the spasms are produced, and confirmed inflammation of the canal established. This production of imflammation of the mucous membrane by the altered contents of the intestines, points out the nature of the disease better than any thing else. The premonitory diarrhœa which is universal during the prevalence of the epidemic, ought also to point out to us the natural system of cure: without this natural diarrhœa the disease would prove universally fatal.

Hence we perceive those cases the worst where there is not a free discharge from the bowels: This often results from the matters not being able to pass along the colon; they consequently remain and increase in acrimony; the spasms, as described, are produced;

there is frequent vomiting, (which is the natural effort of the system endeavouring to relieve itself by the superior outlet); irritation, inflammation, mortification, sinking, and death follow.

In the low cases of collapse these matters have been in a great measure passed off in copious evacuations; the remaining fluids in the system are not sufficient to thin the blood, it stagnates, and the individual is often several hours without a pulse; *yet there are no spasms;* all which clearly points out the nature of the disease as arising in the manner I have already described, and also at once indicates the natural system of treatment.

It has been said that cases occur without purging; I wish those who carelessly affirmed this had told us all the particulars, not for myself, but for the sake of others whom such statements might mislead.

There may occur cases where there is less purging than in others, as I have mentioned; nay there may be complete obstruction of the colon so, as to prevent all purging, yet such should not be considered as instances of cholera without purging, the matters to be discharged are ready collected, but cannot pass off; and, as I have before remarked, are productive of more irritation and mischief than if they did pass off.

5th. It is eagerly desired by the patient.

6th. It may be repeated in any quantity each time affording both mental gratification and bodily relief.

7th. It is universally applicable.

8th. It enters the circulation, dissolves and dilutes the blood, enabling it to traverse the middle passage, and to establish the process of transpiration from the surface of the lungs and skin.

9th. It more immediately passes along the vena porta to the liver, thins the thickened blood collected and stagnant in that viscus, and enables it to commence again its functions so essential to life; so much so are these, that the slightest tinge of the secretion of the liver in the matters passed by stool, is the sure harbinger of hope.

10th. While it restores fluidity to the blood, it furnishes at, the same time, those ultimate principles required by the animal economy, oxygen, hydrogen, carbon and nitrogen;* and the soda at the same time is abundantly supplied.

11th. The whole of these compose this one draught which "*assuages the burning thirst, and is eagerly desired by the sick.*

12th. If it had nothing else even but the last properties to recommend it, it would still be an inestimable boon; but it not only relieves agony, but saves from death; What more need I say?'

The long minutiæ of detail have not been gone into; I have contented myself with exposing the nature of the epidemic and founding thereon the plain and simple principles of treatment which can admit of no mistake. (See the section 'Mercury' for remarks on its action in the epidemic, and see section 'Dysentery' for further illustrations of the pathology.)

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* In the air in solution.

SECTION IV.

AGUE

PHYSIOLOGY, PATHOLOGY, AND TREATMENT.

I have repeatedly pointed out the connection of cholera and ague as shown in their constant association at the same time, in the same place, and in the same individual; the occurrence of the one being found to relieve the other, gradually gliding into each other, as observed in the premonitory diarrhœa, the connecting link, as it were, between them: as also in the consecutive fever, not to be distinguished from the common continued.

I have also pointed out the respective periods of development of cholera and ague as depending on the natural conditions of the system, at their respective periods of attack, and have endeavoured, on these principles, to show their relation to one another.

It therefore only remains to follow up the progress of febrile development as explanatory of the symptoms presented, and as leading to the physiological and pathological consideration thereof in reference to the treatment.

I have more than once referred to the consecutive fever of cholera, especially to its occurrence in Russia where it could not be distinguished from typhoid continued "bilious" fever. In the development of this form of the disease we recognise the concentrated intensity of the epidemic influence, displayed throughout those different stages, constituting the disease called epidemic cholera; but, in other instances, where the first stage is not in excessive degree, denominated fever.

The slightness and variation of the first stage in fever has caused it to be overlooked, and the connection, progress, and development of symptoms have consequently not been remarked.

The grave form of the disease, however, to which I have just alluded, may be reckoned a magnified picture of the real and true features of the epidemic as it occurs in every form and variety, for here are found both extremes united together in the same example. Between these extremes there are innumerable and diversified types, but all and each partaking of the general character of the epidemic as displayed in the junction of these two.

Omitting to observe the connecting links in the chain of development it necessarily has happened that all theories of fever that have ever been broached have proved unsatisfactory, and insufficient for the explanation of the phenomena of the disease. It never occurred to the inventors of those theories that the febrile miasm might exist as well in the collapse of cholera, as in the acmè of continued fever; it never occurred to them, that in the former the blood was collected in the venous system on the right side of the heart, in the latter that it was in the arterial on the left side; that in the height of fever the exhibition of violent remedies (such as excessive doses of tartar emetic) would induce all the symptoms of the choleroid collapse, from which, indeed, (by a stranger) it could not be distinguished; that the same might occur in the natural progress of the epidemic destroying all the external symptoms of fever; or that the former might be so mild as to escape observation, while the latter would be in proportioned severity.

It never occurred to the framers of the numerous theories that the stages of fever were the natural and daily stages of the system abnormally increased; that the collapse of cholera corresponded with the daily collapsing of the blood when it seeks repose and rest after all its labours and fatigues, and that the fever of disease was merely the diurnal return of the tide of life now flowing in muddy streams through the arterial system.

It never occurred to the theorists that a theory to be complete must embrace every symptom that is developed in the progress of fever, following and explaining every action throughout from the collapse of cholera to the acmè of typhoid remittent, and showing that as the egress of the tide so would be the ebb, and as the influx of the stream so would be the rise of the same; that as the impurity of the stream so would be the turmoil of the middle passage, land as the waters of the same so would be the lengthened period of its rise.

I will now explain these apparent enigmas to the general reader as affording him a key to the treatment of fever, a subject which I long laboured myself to understand, but never could till I viewed it as the natural action of the system abnormally increased.

I have already given the physiology and pathology of epidemic cholera; the same explanation applies to all the types there of up to the simplest form of the epidemic, known by the name of premonitory diarrhœa.

I now propose, therefore, to trace upwards and explain the subsequent processes of diseased action constituting epidemic fever.

The rise then of this fever takes place from the period of cessation of the epidemic diarrhœa. This diarrhœa is the derangement of chymification the result of epidemic influence; and this derangement is the first developed consequence of the febrific constitution. Its slight form is observed in the epidemic fever which occurs at various intervals of time, and which lately has overspread every country in the world, following or preceding with exactitude the prevalence of the graver type characterised by its intensity and rapidity. In this fever occur every variety of type from the simple well marked quotidian to the typhoid remittent; but the general character it assumes is that of a simple continued fever. In the derangement of chymification lies the origen of this derangement in the system; the semi-assimilated materials enter the circulation and give rise to all the subsequent train of symptoms. The diarrhœa having been slight the quantity of humours presented to the absorbents are consequently in proportionate excess, and being diluted by the necessary presence of aqueous admixture, the disturbing influence in the middle passage is in proportioned continuance, but of less severity them in the horror of quotidian ague.

The middle passage I call the transit of the vital stream through the branches of the vegetable tree expanded to meet the atmosphere in the pulmonary tissue. The roots of this tree are the radicles of the hepatic system spread out on the internal organs to take up nourishment for the branches, and therefore in proportion to the quantity and quality of that nourishment taken up by these roots, so will be the commotion in the branches of the parent stem.

In the fever before us there is presented to the roots of this tree a mass of unassimilated materials spread over an extent many times larger than the external surface of our bodies; it is absorbed, and passing through the branches, gives rise to that irritation, the constant attendant of the disease before us. The expansions of the pneumogastric and sympathetic nerves, the life of these expanded branches, communicate the intelligence to the machinery of respiration, and a continued cough (with expectoration more or less) is immediately established. This affection of the involuntary muscles of respiration, and the atony of the general system, consequent on the influence of the expansions of the same system of nerves first mentioned, are the principal features of the disease; venesection, purgatives, and all violent remedies have been found to fail.

' Bleeding (says Dr. Good in speaking of the catarrhus epidemicus) is rarely required, and, from the debility so soon induced should be avoided, except in urgent pleuritic pains, which are not common. It was tried copiously by many practitioners in 1782, but they soon reverted to the cautionary tract of Sydenham."

The affection of the pulmonary system will point out to the reader the similar condition of the dermoid tissue, and in both the cessation of the important process of transpiration; in the restoration of this last lies the whole principle of cure, and which can only be eeffcted through the re-establishment of healthy chylification.

All drastic purgatives and emetics exasperate the pulmonary affection, (the blood never presenting the buffy coat).

The cure consists in the application of leeches to the region of the thorax, and the constant exhibition of warm nourishing *transpiratory* diluents.

These, while they pass along over the radicles of the hepatic system, will not only act gently as a laxative, but the greater portion will enter the circulation and establish the process of transpiration, by which there are daily, in health, thrown off from the system ten times the quantity that is passed by stool.

In the contrary unnatural system of cure, by drastic purgatives, incurable typhoid remittent is not long in being fully developed.

Throughout the course of the fever there is constantly present, more or less, a sensibility to external cold, with a minor degree of that shivering ague, which we see fully developed in the pure quotidian form when there is a perfect intermission; and this condition I shall now consider.

It is only upon an extended scale that the relation of the different forms of the epidemic to one another can be perceived; or the influence of the same cause in the production of all the successive varieties clearly demonstrated. During the campaigns in the Kimedy and Goomsoor countries, in the midst of the Coromandel jungles, I had ample opportunities of observing all the different types of the epidemic, from cholera, dysentery, and diarrhœa, up, through all the forms of ague, to bilious typhoid remittent, these were all present at the same time, in the same localities, and often in the same individuals. Frequently, at one and the same time, would be admitted from 70 to 100 patients from the same locality; some with quotidian ague; some with tertian or quartan, or remittent, or continued fever; or catarrhal, or typhoid; some with partial, or catenating, or protracted, or anticipating, or retarding quotidian; some with catenating, or protracted tertian, or the same corresponding varieties of quartan; some with double, or triple, or double unequal, or duplicate tertian; or double, or triple, or duplicate, or triplicate quartan; with all these there were some with the collapse stage in excess (or cholera), and some with dysentery.

In all and every one of these there was one constant symptom more or less present, viz. a derangement of the process of chymification, as shown by the constant tendency to diarrhœa at the commencement of all these forms and varieties; quotidian ague was preceded by the most complete development of this choleroid diathesis. The discharges generally took place during the night or towards morning, about the same time they occur in cholera, and the paroxysms of ague were developed as the day began.

Where the discharges have not been so marked, the fever is generally tertian, and where still less so quartan.

Where the derangement of chylification has not been attended with these discharges, but a tendency thereto, produced by their resting in the tube without making their way through the inferior portions of the descending colon, their acrimony not being in excess, and consequently the constrictors of the tube not called into expelling action, the fever is generally of the catarrhal or remittent typhoid.

In all these fevers, therefore, the development of pyrexia shows that the semi-chylified mass has already entered the blood, and that therefore drastic purgatives can never remove it, but that on the other hand the process of transpiration must be established, which I have stated throws off from the skin ten times the quantity in one natural day that is thrown off by stool : and if in fever this process requires to be doubled in effect to establish health, it follows that, the application of leeches to the topical affections, and the establishment of the process of transpiration must be forty times more efficaceous than the partial and strained exertion of a purgative on the bowels.*

It is all very well, if we could tell when fever was to attack, to give a purgative or purgatives to prevent the absorption of the altered contents from the primæ viæ, but when once these are absorbed the mischief is done, and they must be thrown off from the system in the natural way.

The collapse of ague is the effect of the natural endeavour of the system to expel these matters before they are absorbed, and when she is assisted in this operation, the best results follow; the diluents that have been taken not only traverse the tube and remove any cause of irritation, but the remainder enters the blood, which is thus enabled to depurate itself by a copious perspiration, which will be observed on a reference to my own case, which was an example of the severe form of the first stage of ague. I distinctly perceived the febrile movement in the occurrence of a transient shivering on the decrease of the violence of the symptoms : I knew immediately that it was a favourable sign, that the febrile diathesis was commencing ; I perceived the chill (never present as long as the low collapse continues).

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* Comparative anatomy, displays the principle of action that should be followed, in unfolding the fact that in some instances there is only one opening to the alimentary canal. It is evident that the depuration of the blood in these cases must take place in the natural way from the roots towards the branches, not from the branches to the roots, which, however, many attempt to effect in curing the fevers of the human species.

When the system is robust, and in the spring of the year, the quotidian is the most marked form of the epidemic. The fluids of the body at that time are of a more homogeneous description than at the later periods of the year. The pulses are fewer, and consequently the *excitement of every organ* is less, and their action more regular and uniform ; chylification is more complete, from the less expenditure of the secretions ; consequently when the epidemic influence prevails, the system vigorously resists its efforts, expelling the grosser materials from the bowels, and afterwards the thinner through the pores of the skin.

But as the season advances the diurnal actions of the system are increased in proportionate degree. The pulse indicates the celerity of the circulation, and points out its *activity in every organ*, the demand for fluids to supply the increased transpiration calls also into increased activity the expanded roots of the absorbents, which eagerly take up whatever they can get ; they, by this constant action, loose that refined descrimination which characterises all parts of the system previous to the inurement of habit ; and what they formerly rejected, as hurtful and repulsive, they now eagerly admit through their tender orifices.

On the reigning, therefore, of the epidemic constitution, the *same degree* of deranged assimilation will not produce the same sudden effects as at the other mentioned period. The radicals of the absorbent system continue to absorb that which would at the other period have been rejected, and this absorption goes on *accommpanied both by the development of fever and the derangement of the primæ viæ.* The quantity of fluid absorbed enables the middle passage to be performed with less immediate danger than in pure quotidian ague, but the irritation, though not so violent, is more continued, lasting indeed throughout the disease, and extending to every crevice of the system.

When the heats have been *excessive,* and the locality marshy and confined, the same callous condition of the mucous expansion is still more completely established, and when the epidemic influence prevails the effects are in proportionate degree, the bile mixed in greater or less quantity with the contents of the bowels is also taken up, and thus gives the name to a particular description of fever; but the presence of this bile *is perfectly accidental ;* and when in excessive degree giving that golden hue to the skin, the instances are the least dangerous. It is in those cases, marking its deficiency where there is the greatest danger, the skin is a dusky livid colour, and covered with petechial spots.

Exactly, in the Coromandel jungles, did the fevers prevail after this fashion ; as the heats increased they put on a more diffused character. The quotidian was no longer able to throw off the mass of fluids absorbed, but glided into the remittent and continued forms.

The only officer I ever lost, had contracted the fever some days before I saw him, *he had been using pergatives, freely*, he sauk with all the characteristics of typhoid remittent, the skin of a dusky livid colour. Had I not been misled by the prevailing dogmas of the day, hatched in the closet by those who confound miasmatic fevers with inflammatory affections, I would have saved this officer.

The fevers, I have said, assumed all types ; those presenting the most bilious aspect were invariably the most tractable ; there was here a secretion to work upon, in the others there was none ; these last assumed the lived aspect of death,and were only saved on the reappearance of the *bitter* secretion, after a continued and incessant exhibition of remedies best calculated for its speedy restoration.

It would be endless to enter into individual illustrations of all the different forms that prevailed ; the description of one will serve for the whole, making allowances for the season of the year, locality, heat, idiosyncrasy, diet, and treatment.

Quotidian ague is the basis of all the other forms; it is the skeleton map upon which all the others can be traced ; it can be seen from its liberation from the collapse of cholera up to the fullness of its development in typhoid (erroneously called bilious) remittent.

It can be perceived keeping time with the natural fever of the day, dissipated in transpiration as the latter declines, and rising with it again on the following day.

From the discharges from the bowels to the accession of the paroxysm, there is a longer or shorter period of time varying from one or less to several hours, during which the blood is collecting in the venous system; and, when it is approaching this condition, the individual can tell by his internal sensations that the period of fever is not far off. He however cannot give any definite descriptions of his symptoms, but merely says he knows that he is going to have fever. The appearance, however, of the countenance betrays the venous congestion; it is pale, and there is a lividity about it, with a sombre expression. The hands and feet have the same pallid appearance, and the tips of the fingers and toes, particularly observable about or below the nails, are of a blue venous colour. This is what I call the collapse of ague, it continues for a longer or shorter period, till the quantity of blood accumulated on the right side of the heart acts upon iself in the venous column, and is forced in torrents towards the middle passage, along with the newly absorbed unassimilated matters. The necessary process of transpiration does not take place, and the heat that is generated is not carried off; the inspiration, therefore, of the external air is consequently productive of a sensation of intense cold The blood that passes on to the dermoid tissue is likewise unable from its condition to establish transpiration, and the same sensation of cold is experienced on the external surface from the contact of the air which now does not carry off the extra heat.

The extreme sensation of cold, however, is principally experienced about the chest, throat, and mouth, and on drawing in the air: the individual affected siezes any covering that is at hand, throws it over himself, and also closely applies it to his mouth to temper the air as it enters the lungs. If there is a fire at hand, he immediately directs his attention there to, applying his mouth as near as possible; or if the sun shines, he basks in his rays till the fit is over,* and perspiration has been established.

Sometimes, however, the fit is extremely violent, and in addition to the shivering from cold, the abnormal contractions of the nervous expansions of the pneumogastric and sympathetic individually induce a similar condition in the muscles with which they are connected. The difficulty and stifling in speaking, with the rapid catching of the breath, are readily explained by the connections of the phrenic, the nervus vagus, sympathetic, and ninth nerves; the last supplying the omo-hyoïdeus, sterno-hyoïdeus, sterno-thy-reoïdeus, and thyreo-hyoïdeus, as well as the mylo-hyoïdeus, genio-hyoïdeus, genio hyo-glossus, stylo-glossus, and lingualis, accounts for the difficulty in articulating; and the connections of the phrenic explain the catching of the breath more especially in regard to its importance to respiration; while at the same time the other nerves immediately connected with the respiration are also similarly affected with short irregular contractions.

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* When I had the Nagpoor fever I used to do this, it was the readiest method of obtaining relief to the shivering.

The corresponding columns of the voluntary muscular nerves (of the chest and superior extremities especially) are similarly influenced by the irritated expansions of the pneumogastric and sympathetic, and hence succeed those involuntary spasms of the flexors, contracting the extremities, and the chest upon itself.

The external and internal expansions of the sensitive branches of the trifacial suffering from the similar impression, as well as from the sense of intense cold, induce those corresponding irregular contractions in the expansions of the masticatory branches, causing that constant vehement chattering of the teeth.

The weight of the column of blood increases on the right side of the heart, being unable to pass freely through the pulmonary tissue, and the sense of impending suffocation is experienced.

The lancet is at this time imperiously demanded to take off the pressure, otherwise the consequences may be fatal.

It should be followed by a liberal exhibition of thin diluents *as hot as they can be drunk*, the effect of which is often an instantaneous relief, the perspiration bursting from every pore.

This finishes the paroxysm for the day, but, on the revolution of the diurnal period, it will again return with the same intensity; the lungs will sustain permanent injury, and the organs most liable to engorgement and distention will suffer from the weight of the venous column. Of all these, the spleen is the most obnoxious, and hence during the fit it swells out, and its rising is distinctly perceptible to the eye. A few more returns of the paroxysms, and it will frequently be found to occupy the greater part of the abdomen. The liver of more solid consistence, does not suffer in this stage; but, on the establishment of continued pyrexia, it partakes of the general derangement.

In other instances when the height of the paroxysm is over, and when depuration is not freely established, the arterial system becomes engorged as the venous was before; the countenance swells out and the individual experiences a stiffness particularly about the eyes, which are painful on being rotated. The whole dermoid tissue is engorged and distended; (and in fact so are all the capillaries of the arterial system); the blood has now the same difficulty in passing into the venous system, as it had before in passing through the lungs into the arterial.

The pressure must be taken off the arterial system, as it was off the venous before. The return of the paroxysm must be prevented by a liberal allowance of quinine and warm nourishing diluents. The quinine should be given to affect the system, which is known by free perspiration and a cool skin, and a slight noise in the ears (compared to the distant sound of the sea.)* The quantity of quinine will depend much on the liberal allowance, or otherwise, of warm diluents; and in this respect† it resembles calomel of which frequently any quantity may be given without effect, if the process of chylification is not had in view: *See section* "*Mercury*."

The effects of this repeated abnormal action in the passage of the blood through the pulmonary tissue may be readily imagined. A constant harrassing, suffocating cough attends it, and the foundation is also laid for incurable diseases in this and other organs. In an hospital I received charge of in the Goomsoorah campaign, I found nearly 300 patients laid up with miasmatic fever; some were in the last stage, and others were rapidly advancing towards it; there were numerous cases of hydro-thorax, engorgement, hepatization, and tubercles of the lungs; adhesions and abscesses between the pleuræ; enlargement of the heart, and hydrops pericardii; affections of the cerebral organs; enlargement of the spleen, in many cases occupying the greatest part of the abdomen; dysentery, diarrhœa, ascites, general dropsy, and paralyses, &c.

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* Some patients thave compared the sound experienced to that of voices indistinctly perceived; or as if these last proceeded from a pit, or behind a wall.

† The ringing in the ears frequently comes on after a meal, or drinking fluids, thus pointing out the natural principles of treatment.

Instead of adducing numerous examples of the different types of fever, which would only serve to bewilder, and perplex the mind, I have contented myself by giving from other authors the four cases which will be found in the sequel. From these will be perceived the mildness frequently of those symptoms ushering in the disease which eventually terminates in death; I will leave to the reader the easy task of deducing therefrom those practical conclusions, the object of these observations to illustrate.

I shall also endeavour to confine my remarks to the shortest possible compass, not allowing them to stretch out into a labyrinth of multifarious references to all the thousand varieties of fever which occur, but rather try to embrace the whole in one short but general series of physiological observations, *alike* applicable in principle throughout the whole range of what are called marsh and jungle typhoid fevers.

Let me premise then that the substructure of all these miasmatic fevers rests on the defective process of chylification, and that every remedial measure, had recourse to in the treatment, which has a tendency to increase this defective condition, invariably augments the severity of the fever. Hence, on the one hand, the destructive agency of drastic doses of salts, croton oil, gamboge, colocynth, tartar emetic, &c. and, on the other, the beneficial influence of moderate abstraction of blood, and the restoration of the assimilating, and consequent, transpiratory processes. By the former all means and energy are destroyed, by the latter the natural passage of the fluids outwards is promoted, absorption takes place, the changes in the blood proceed, and copious perspiration bursts from every pore.

The secondary symptoms, which are often established in fever, are frequently confounded with the disease itself; and the mind of the young practitioner is bewildered in contemplating the long catalogue of cerebral, pectoral, and abdominal fevers, and the numerous combinations again of these.

A clear perception of the difference is necessary for the successful treatment of both.

The cases which I have borrowed and given in the sequel will illustrate this better than any description; the individuals will be observed to perish in spite of the severest measures of venesection and mercurialization, neither of which, although they may remove topical congestion and inflammation, will cure the fever, which continues to return, at the stated periods, notwithstanding that the saliva is flowing in streams from the mouth.

All the various forms of continued and remittent fevers are merely the quotidian with engrafted symptoms, when these are removed either temporarily or wholly, the fever still remains, and will again return at the stated period unless obviated by the support and encouragement which must be given to the process of chymification; in other words, as we sprinkle water on the drooping plant, and moisten its roots, so the roots of the animal tree which are spread out upon the bowels must be similarly and carefully attended to, if we wish the drooping individual to revive. From where else is nature to derive support? Not from calomel, or a black dose surely, or jalap or croton oil?

How then can the blood be thinned, and the salutary process of perspiration kept up?

The finer tissues of the body, not permitting the flow of the thickened fluid, retain it in their meshes; nuclei are formed for extended engorgement or infiltration, and irreparable lesion is established.

How can a stream be purified if its source is diverted into a new channel?

How can the blood be purified if the secretions are averted from the hepatic radicles and expelled the system?

The bowels are not an excrementitious receptacle; they are formed by the expansions of the hepatic system, they are in fact that system receiving within its folds, and sending from thence, all nourishment for the support of life.

The destruction of the nutrifying process in these fevers, is the destruction of life; consequently the dreadful mortality in many fevers, such as in what was called the Nagpoor fever, wherein it was at last found that support was necessary to enable the individuals to rally. This subject is illustrated in the sequel by a quotation from Dr. Spry's Modern India.

The principle I have endeavoured to illustrate, is there clearly shown in the dreadful mortality that followed the depleting and reducing system, and the subsequent necessity of throwing in stimulants to save the patients' lives;—which is the attempt at the eleventh hour, to support the process of chymification, hitherto completely destroyed.

The bile, the regulator of chymification, the resister of putrefaction, and the supporter of life, has been, although the most important secretion of all, the least understood, and the most abused.

I have frequently referred to this interesting subject; it cannot be too strongly impressed on the mind.

The condition of the hepatic system as we descend the scale, I have also adverted to as pointing out the place it occupies in the chain of actions, necessary to life.

Nothing so easy as to theorise on the biliary secretion; the very word "bilious" is a host in itself; volumes of theories have been written upon it to little or no purpose; their absurdity appears immediately on observing the disposition of the corresponding organs in the different classes of animals, and to which I have briefly referred in the sequel.

I will only here remark upon the abuse of the term bilious and the odium that is heaped everlastingly upon the bile; and point out the absurdity of every notion that has been entertained regarding it, by simply referring to one single disease, that of jaundice. In this the whole surface of the body, nose, eyes, ears and mouth are actually as yellow as if daubed with gamboge or turmeric, and continue so for days together, without the slightest unpleasant symptom, as long as there is no hasty interference of art. The appetite may remain, and chymification continues, absorption goes on, and the yellowness quickly disappears. The exhibition of drastic purgatives, during the reigning of the febrile constitution would induce the development of the purest form of typhoid remittent fever; the biliary tinge of the surface, existing, would induce the supposition that the bile was the cause, and hence give rise to the term bilious remittent.*

In the yellow fever the same is found to be the case, *in the majority of* fatal instances there is little or no yellowness at all. A name, therefore, is very apt to mislead, & if it is expected to find the skin yellow in yellow fever, bile in cholera, or jaundice in jungle bilious fever the expectant will be woefully deceived. In the worst cases of all these they are absent as I have already remarked in various parts of the work, where I have endeavoured to enforce attention to the all important secretion in question, without the flowing of which, and constant abundance in the primæ viæ, the whole economy of the system is upset. The bile is the oil which lubricates the wheels of the animal machine,—without it the friction of the fluids soon causes the stoppage of the circulation.

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* I had an excellent example of this the other day in the case of an officer on board the Reliance (Lt. Bush.) He fell ill and became as yellow as a guinea all over, there were present also feverish symptoms, ; to a tyro, the case would have had all the appearance of a very formidable one. He was brought up from Cooly Bazar (where the ship was lying in the Bight, by no means a desirable situation for a large vessel) and lodged at Spence's hotel where I was staying. Instead of proceeding to work in the usual way with tartar emetic and salts, and croton oil, or some such violent remedies followed up by calomel, &c. (whereby the stoutest are irrecoverably reduced to death's door,) I merely contented myself by allaying the urgent thirst with the effervescing draughts *(ad libitum)* which had the usual desired and beneficial effect; and he expressed the extreme relief and gratification they afforded him. He felt revived from them and being able to sit up was allowed to come to table and to partake of what he might fancy (in small quantities), small quantities also of diluted wine and beer were also allowed, more especially as there was a desire for them. The effect of this treatment was, that the patient slept soundly the whole night, and although the yellowness of the skin was even increased, yet he felt 50 per cent better, in the morning. The yellowness gradually wore off as the appetite returned. This, therefore, is a case pointing out the nature of the secretion and that its presence in these instances, instead of being hurtful, is actually necessary for the continuance of life. The system of drastic purgatives in this and similar instances, induces the full development (to which this case was verging rapidly from the former treatment) of typhoid "bilious" fever.

The general erroneous conclusion that drastic purgatives are necessary in these and all similar instances, leads to a general and heavy mortality. I have mentioned that the only officer I ever lost in these jungle typhoid fevers, had been physicking himself with drastic purgatives for a couple of days before I saw him; and I may also mention, as illustrative of the generally prevailing erroneous ideas on the subject that the friends of Lt. Bush were surprised that he was not drenched with black doses or emetics, while they were no less equally but agreeably surprised to see their friend emerge in safety from his critical situation, under a system of treatment as novel to them as it was *agreeable* (which is half the victory) and beneficial to the patient. Calcutta, 1838. W. G. M.

The bile also when vomited, in apparently large quantities, has likewise given rise to similar errors. The quantity appears excessive from its dilution, which, even when in small quantities, will thus have the appearance of excess.

In the abnormal action of the stomach and bowels on the first accession of ague, the matters thrown up are destitute of the secretion, there is sometimes a slight greenish tinge, but none of the bitterness is found to be present. Its absence from the mucous surfaces (whose natural lining or covering it is) is the cause of the extreme irritation. When the excessive vomiting is relieved and assisted by copious diluents we find, after a time, that the matters rejected assume a yellow tinge, and the individual immediately experiences an intense bitter taste: *from the moment of this taking place there is an immediate relief*, and a tendency to repose after the extreme exertion. Here therefore the deficiency, not the excess of the secretion, is the cause of the symptoms; yet this is another example of the many instances where the term bilious has been misapplied. This very intermittent fever too may not terminate in the usual manner, for, if drastic purgatives are exhibited, the depurating process by the skin will be irremediably destroyed, and the features of a remittent or continued fever will be presented, and which then receives the additional appellation *bilions.*

I cannot better illustrate the tenor of the preceding observation than by giving from another author the history of the treatment of one of the severest epidemics that has occurred in India; and which was, in the year 1817, in the instance of the fever which raged at Nagpore. The activity of the epidemic constitution was then displayed all over India in the severity of the febrile development; and the increasing intensity of the same shortly afterwards revealed itself in the absence of the stage of re-action, *or cholera, where the fever was turned in upon the bowels.* The latter condition has been already considered; it is to the former the succeeding observations allude; wherein the contents of the stomach and bowels, instead of being expelled from the system, (by reason of their altered condition inducing the spasms of the intestinal tube) have been absorbed into the general reservoir of the circulation, (already of a febrile character) producing that increased commotion and disturbance in h e system denominated fever.

" When our European troops were first marched into the Nurbudda and Nagpore territories, through the Bundelkund states and the Deccan, on the breaking out of the Mahratta and Pindarree wars, in 1817, our surgeons treated the fever which assailed so many of the men, as they had been accustomed to do the bilious remittents of the Bengal province.

The attack was ushered in with symptoms of peculiar disorder, and the lancet with calomel were for ever in requisition. But the patients died. So violent were the *inflammatory* indications at the onset of the fever, that copious and frequently, repeated bleedings were absolutely necessary; yet, when the febrile excitement was subdued the patient, instead of remaining tranquil and composed, to allow of his system being brought under the influence of mercury, which was the practice in Lower Hindustan, he lost at once his presence of mind, and, in the course of three or four days from the commencement of the disorder, would fall from a state of high excitement to one of extreme exhaustion, muttering delirium and death.

This result was unfortunately so general, that the subject soon became one of serious and most anxious consideration. Among the medical officers themselves, *a great* diversity of opinion existed. Some attributed the mortality to the malignity of the fever rather than to any essential difference in its nature, while others, as stoutly maintained, that it was a disorder sui generis, and christened it, by way of distinction, the Nagpoor fever. However disposed such party were to defend their respective notions on this point, the entire medical staff were tolerably unanimous in the belief that to work a cure, a totally new plan of treatment must be adopted.

The consequence was the resumption once more of the exploded doctrines of Brown. The violent inflammatory action, which always characterised the attack, was subdued as before by copious depletion and antiphlogistic diet. It was in the second stage that the innovation on the ordinary received opinions of the schools was made. Instead of administering calomel merely, and trusting to the natural powers of the constitution, as heretofore, immediate recourse was had to diffusable stimulants, and the nervous depression overcome by frequent and full draughts of bottled ale or negus. The result amply justified the experiment.

The prostration has, in some cases been so excessive that, to keep the heart in action, *I have known as many as six bottles, (a pint and a half each) of pale ale given to a patient in the course of twenty-four hours,* and he has recovered, without it, he must have died. Again, when the pulse has become no longer perceptible at the wrist, and respiration scarcely discernible, bottled beer, poured down the throat, has restored the power of the circulation, and saved the patient. By this plan of treatment the pulse acquires strength, *the delirium subsides,* and about the end of the fourth, or fifth day, the patient enjoys some natural sleep. *Danger* may then be said to be at an end, but only when the convalescence is watched with the utmost vigilance."*

From the above may be gathered an inexhaustible harvest of rich reflections on the treatment of fever, which, it would be well, were they more generally considered than they appear to be. We see in the above the effects of the extreme depleting and reducing process to be such, that the exhibition of stimulants *in an inordinate degree* is necessary to preserve the patient from im pending death. This is all our own doing, *not that of the disease,* we drain the system from within and without of the last drop of circulating fluid, and continue doing so till death is peering from the orbits of the sick, when we immediately veer about, and throw in, with the greatest profusion and liberality, stimulants of every kind.

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* Spry's Modern India.

Let us, for instance, take any individual in the enjoyment of the most perfect health of mind and body, and strong and robust into the bargain: let us bleed this individual, and administer a strong purgative; debility is forthwith the consequence; but not only debility, but we find the patient complains of headache, his skin feels dry and hot; there is an ardent desire for something to drink; *he must not have what nature dictates!* but he must be bled and physicked again! He is, consequently, bled and physicked, and consequently the headache and heat of skin are increased; the patient begins to talk incoherently; this is put down as the effects of determination of blood to the head, leeches are forthwith applied, and strong purgatives again exhibited to act as a derivation from the brain; complete incoherency of ideas, insensibility, and death follow. If, therefore, in an individual, in the enjoyment of perfect health, such treatment is productive of fatal consequences, how is it possible, in the extreme debility of fever, that any thing else save death must result?

Every death, in marsh and jungle fever, that I at present recollect, *has been brought about as much by the treatment pursued,* as by the disease itself.

The only officer that I ever lost in these jungle fevers, had been physicking himself, and was phy sicked freely for two days before I saw him.

In the history of the plague, there is a remarkable confirmation of the truth of these observations on this natural doctrine of fever, in the fact, that in that disease *costiveness is attended with no harm, and often with little inconvenience; and it is therefore perfectly evident that, whoever takes in hand to treat the plague (ignorant of this circumstance) must infallibly destroy his patients, without the hope of saving a single case.*

Yet, in fevers of lesser magnitude and danger, this condition frequently engrosses the whole attention in the treatment, and the extreme debility, and often death that results, is mistaken as the effects of the disease and not of the treatment. If, in the graver type of fever, this symptom or condition is unattended with danger, or even inconvenience, of still minor consequence should it be considered in the less severe forms of disease? Yet, strange to say, the treatment of fever now-a-days consists in little else than *upsetting* this very condition which, in the worst of all fevers, is found not to be attended with inconvenience. If such should be the case in fever, where we have comparisons to guide us, is it wonderful that the same unnatural system should occur in the treatment of cholera? In both the indications of nature are overlooked.

From this and other observations, I learned that free and constant purging, was merely another name for death, in these fevers. Every symptom is aggravated by the practice, and speedy incoherency of ideas, that is, weakness of intellect, induced, soon followed by delirium and insensibility.

Nothing has tended more to retard the progress of improvement, in the treatment of fever, than the division of the same under different designations, such for instance as the Bengal endemic, Nagpore fever, the Arracan fever, and a thousand others;—which has no other effect than perplexing the judgment and confusing the mind; all these being nothing more than the common marsh or jungle fever, easily distinguishable, by its usual characteristics, under all circumstances of time, place, or severity. As an instance, in point, I may mention that when I marched to Nagpoor, in 1827, and was near the station, some of the party were attacked with *the Nagpoor fever.* Not knowing anything of *the Nagpoor fever,* in fact never having heard of it at that time, I bled the individuals, and with perfect success; but I did not again do away with that success by the exhibition of strong purgatives; I was contented with what I had done; I let well be alone be.

When I arrived at the station, I was told "we don't bleed here, it does not answer in the Nagpoor fever." Nor would it have answered in my cases if I had, after the bleeding, thrown in the jalap or calomel or roton oil, or tartar emetic and salts; instead of these, while the leeches were still hanging in festoons, I allowed the sick whatever mild or innocent drink they fancied; the heat of skin disappeared, and profound repose succeeded.

Heat of skin is extremely apt to mislead those who have not seen much of fever; it puzzled me much at first, finding no explanation of it in authors. From its almost constant attendance in every case, more or less, without any corresponding increase of severity in the symptoms, it should not be attempted to be removed by remedies acting on the mucous membrane of the stomach and bowels (which all purgatives do) as well as tartar emetic, ipecacuanha, &c., they invariably increase the dryness.

The two last sometimes occasion a moisture for a few minutes, during the action of vomiting, but it immediately disappears again.

Of all diaphoretics in marsh or jungle fever, none can stand a comparison with the sulphate of quinine : the heat of skin soon disappears, and the perspiration flows from every pore.

This effect I ascertained by chance, by giving it in despair, in cases of remittent fever, where every thing had been in vain tried to produce perspiration or a cool skin. The effect was striking and singular, a relief to ever symptom, and a return of the digestive powers. It may be readily supposed, that I never afterwards harrassed the sick with ipecacuanha, and tartar emetic.

Cases there may no doubt occur requiring nauseating, doses, &c.; of these I do no speak, *but simply of the fever uncombined with topical affection*. But it should, at the same time, never be forgot that while topical affection is present, as in the head or chest requiring leeches or venesection, the exhibition of quinine, at the very same time, should never be omitted ;—if it is omitted, the next paroxysm will undo all that has been done, or perhaps at once destroy the patient.

The abstraction of blood relieves the topical affection, the quinine prevents the return of the fever. A distinction, therefore, is to be made between the independent character of the fever, as cured by quinine, and the secondary dependent symptoms, relieved by vene section.

It is evident, therefore, that the cure of the fever is the only plan that can prevent other symptoms from arising after each successive paroxysm. For instance, one paroxysm, not fully developed, will leave an affection of the lungs on one day : on the succeeding day the paroxysm will leave behind it a cerebral affection.

And in remittents, in fact, in all these fevers, the repeated paroxysms always leave behind them some fresh accumulation of disease. The weaker the individual is, these diseased deposits will, in their effects, be more obvious; and, in cases of great debility, induced by drastic purgatives, or continued bleeding without an object, a paroxysm very often ends in complete insensibility; the system has no longer power to withstand the effects, or even to make any attempt to throw off the fever by perspiration. It is obvious, therefore, that the sooner we assist nature in doing this the better; and the way to do it, I have endeavoured to show in pointing out the distinctions between fever itself, and the secondary symptoms.

To illustrate the point still further, let us only turn to cholera, and we will perceive, in a double manner, the confirmation of the principle: Here the dependent symptoms are in the first place shown in the extreme purging; in the second place, (in the consecutive fever) they are shown in the cerebral, or other, affection; between these is the fever and the febrile movement, distinct from both.

The natural termination of fever is by the skin, and when it does so, the perspiration is immense; purgatives, therefore, which destroy and subvert the natural chain of actions that take place from the internal parts towards the external, are injurious, and tend to the production of the remittent and continued forms. The natural process must be assisted, and nothing appears to surpass the efficacy of quinine, assisted by a liberal allowance of stomachic aromatic tonic diluents, *according to the wants and desires of the sick.*

We have always at our command means to allay the development of disease in any of the tissues, in the abstraction of blood either topical or general; but any interference with the process that nature adopts to throw off disease by the surface, will be followed by injurious consequences.

The abstraction of blood, to relieve excitement, resembles the natural process of the system, relieving itself by evacuations from the surface But the exhibition of drastic purgatives subverts entirely the regular chain of actions, deprives the system of those only means it had at its command, and lays the foundation of incurable pyrexia. By draining the bowels, we drain from the system all that nature has to work upon. There are no excrementitious secretions poured into the primæ viæ; they are all directly subservient to the continuance of life; it is from them the animal tree absorbs by its roots those juices which, entering the blood, thin it, produce changes, and arethr own off by the surface: the removal of this support destroys life; the object therefore in fever is, to afford those materials best calculated to assist nature; none surpass the sulphate of quinine and other preparations of cinchona; they resemble the principal secretion that is poured (in health, without ceasing) into the bowels; they assist in the processes of assimilation, and, being absorbed into the blood, produce those profuse perspirations which I have remarked as the result of their exhibition.

I have already adverted to the importance of the biliary secretion in the actions of the animal economy (in the preface), but the subject cannot be too often referred to; it is the pivot upon which hinges the whole treatment of fever.

Comparative anatomy discloses that there is no animal destitute of the hepatic system; and, in many, it and the stomach appear to be one and the same. In man the arrangement is on a similar principle, only that the secretion appears to be poured, from one distinct organ, on the food, as it passes from the stomach. But it also often flows into the stomach, when substances remain there that are of difficult digestion; it goes to assist the gastric juice with its different, though more powerful properties, and soon reduces the matters to that consistence enabling them to pass the pylorus.

The antiseptic properties of the secretion are such, too, that the long and tortuous cavity of the primæ viæ, frequently filled with all manner of substances, is kept free from all traces of putrefaction during the long period often of 100 years and upwards.

The importance to the animal economy of this secretion is such, that nature has ordained that, after it has performed its principal part, its elements shall not be lost, but be again absorbed and conveyed directly back to the liver to be again formed into the secretion, and again poured out on the aliment necessary to life. It thus performs a circle, continually in motion, from the beginning to the end of life. When it ceases to be absorbed the animal ceases to live; neither the white blood by the lacteals, *nor the red blood by the vena porta are* carried into the general circulation; the contents of the bowels undergo decomposition; the blood is deprived of its essential support, thickens, and pyrexia is developed.

Comparative anatomy has, in many instances, disclosed the important character of the secretion, and in none more than in the fact, that some animals have only one opening into the alimentary cavity, thus proving the powerful assimilating property of the secretion, in thus reducing the whole of the aliment to a perspirable nature, and showing that its own evacuation from the system is any thing but necessary to the continuance of life.

In man, its evacuation is determined by the quality, and more especially the quantity of the ingesta, which, if greater than the bowels can properly contain, are discharged loaded with the secretion, in fact, almost resembling inspissated bile. But, if the ingesta are small in quantity, and of a completely nutritious nature, there will be no evacuation from the bowels for years together.

From these few observations will be perceived the all-important nature of this secretion, towards which the whole attention must be directed in the treatment of fever.

The animal tree must be considered totally apart from the vegetable, which will be perceived to consist of its radicles and branches distinct from the former. The radicles arise from the expansion of the hepatic system (are in fact that system), and the two stems of red and white blood extend again their branches to meet the atmosphere in the pulmonary tissue. The comparison is here complete. The subsequent processes result from superadded organs, afforded for the purposes of external relation. In these, any deviations from health are the result of derangement in the former, which, in ague, cholera, and dysentery, consists in a greater or less deficiency of the important secretion alluded to.

In cholera, from the total failure of chymification, the radicles of the vegetable tree receive no nourishment,—the reservoir of blood consequently is minus its daily supply, it thickens, and cannot pass through the tissue of the lungs.

In ague the failure of chymification is only partial; the effects however are plainly discernible in the accumulation in the venous system; the blueness of the countenance and extremities; and the dark colour, and gelatinous-like consistence of the blood when drawn in the collapse.

The semi-digested aliment is absorbed, and mixed with the mass of blood, but its passage through the lungs is often attended with difficulty, and even suffocation. This is the febrile movement in the branches of the vegetable tree; the subsequent ones are soon developed in those of the animal. The surface becomes distended and blown out, particularly observable in the countenance (and felt by the individuals themselves); and the uneasy sensation in the skin arises from a similar cause to that productive of the sense of suffocation when the fluid was passing through the lungs, the tissue of which it affected in a similar manner. The sluggish and viscid nature of the blood resists the perspiratory process; the tissues are consequently dry and hot, and the air imparts a cold and chilly sensation, causing the shivering, and the chattering of the teeth. If these sensations continue, remittent or continued fever is established; if depuration freely supervenes the disease is an ordinary quotidian. If the last does not take place, the plan to be pursued is obvious, viz. drawing the fluid from the surface (since nature is not able to do it herself), and the liberal allowance of diluents to assist the depurating process; both must be continued till an effect is produced. The effervescing draughts, as diluents, claim precedence of all others, they are grateful to the stomach, and can be taken in any quantity. Topical affections are readily relieved by leeches, which are to be applied till relief is obtained.

It is more the object to direct attention, in these remarks, to general principles than to particular examples, which are of such multifarious character; but even with these, a general principle may be inculcated, which is, that they are never to be confounded with the fever which has its independent existence. Illustrative of this I may mention the following instance:—One night, in Goomsoor, a man was brought, in an insensible state, to hospital just as I was leaving. On inquiry, I found he had had several attacks of fever before; I accordingly attacked the present symptoms topically, by shaving the head, and applying a wreath of leeches round it, below the base of the skull; when they had fixed I had him taken outside as there was no other place for the free application of the cold ablution. The night was cold, and the water too, yet it was long before any symptoms of sensibility returned; at last he sat up and tried to look about, but the leeches, hanging in long festoon-like clusters about his head, prevented him,—which made him peevish, for he now also began to feel it rather cold, and drawing a wet mat near him, put it on his head to keep off he water, which he took to be rain. The leeches continued to bleed, and the water was continued to be dashed on him, till he rose himself without assistance, and walked into the hospital.

This, therefore, is an example of the method of treating a topical, superadded symptom. The fever was distinct, it had to be cured afterwards

In every case nearly a similarity of system must be pursued. The disease must be drawn towards the surface by leeches, &c., not determined to the bowels by drastic purgatives, which have been the death of thousands, in marsh jungle and typhoid fevers. I have had the Nagpoor fever, and the fever of the Coromandel jungles myself, and speak feelingly, therefore, on these subjects; in both I was nearly killed by purgatives, but found out the mistake in time.

The sulphate of quinine cannot be given too soon; heat of skin and dryness of the surface do not preclude its use; they are quickly removed by its liberal use.

The *full* exhibition of grateful diluents assists its operation in a marked degree. The perspiration is in proportion thereto, and the depuration of the blood is much more complete in consequence. The quantity will depend on the severity of the disease. In the last campaign, in Goomsoor, I frequently gave to the extent of 100 grains in 24 hours, with complete success. I, at one time, foolishly gave it in pills, it is only a mode of throwing away the medicine. In solution a *free* allowance of warm aromatic bitters greatly lessen its expenditure, for the effect is produced in a comparatively short space of time; the fluid being in quantity reaches the lower portions of the tube, and is in immediate contact with all the expansions of the radicles of the white and red blood; part is conveyed to the liver direct, and the secretion of healthy bile, hitherto absent, immediately commences; the other flows on to the general reservoir of blood, and exerts its specific action; the diluents assisting at the same time, the perspiration bursts from every pore.

In the absence of quinine the cinchona is almost equally efficacious; I found that it produced the same ringing in the ears as quinine, and I always gave it with that object in view, as marking its influence over the system; the switenia, febrifuga, and melia azadirachta, (the rohunna and bead tree or Neem,) I did not find produce this ringing in the ears; and their less efficacy was in proportion thereto; they, especially the last, produced diaphoresis however, and were consequently beneficial, and hence their abundance, and indeed the abundance of hundreds of other equally if not more efficacious, always afford ample opportunities for the relief of fever in every situation.

The bark should be given in repeated doses to produce the specific effects which are known by the flow of perspiration principally, and by the ringing in the ears. There is often a dryness of skin obstinately remaining in these fevers, which is extremely apt to deceive; it is not an active symptom; and the attempt to remove it by harsh measures invariably aggravates the symptom. This dryness of the skin is present on the same principles as that daily perceived in health, after fasting or fatigue, and which disappears in copious perspiration, after the usual meals; and the same with headache which is often present, it too must be viewed in these cases on the same principle. Who is there who has not experienced this when deprived of his regular meal, and who is there who has not found it disappear when the regular supply of nourishment has been taken into the system? These circumstances, therefore, must be recollected in the treatment of asthenic fevers.

I have several times nearly witnessed lamentable proofs of the liability to be deceived by the condition of the skin.

Captain G. L. of the Regiment, contracted the ordinary epidemic fever, attended as usual with nausea, vomiting, headache, pyrexia; I set about, in the usual way, to cure it, but to no purpose. Mercurials were continued, but the patient got worse, and, after some days, feeling himself convinced of his approaching end, he made out his will. His voice was nearly gone, countenance livid and bilious, cheeks drawn in, and mouth and tongue covered with black crust. The usual and common system;

which I was pursuing, I felt was death to the patient. I changed it, and exhibited mulled wine constantly at regular intervals ; from that moment he revived and lived. Unfortunately, however, the evil effects of the previous treatment began now to be developed. Ptyalism commenced with an exceeding sore mouth. By proper care, however his mouth (or health in general) did not suffer. He recovered completely, and I sent him to Europe from whence he is about to return.

Another case (that of Captain D., of the Cavalry), much resembled this. His occurred previously, and it therefore ought to have taught me a lesson. But, as I have frequently said, a million lessons are of no use unless there is a ruling principle to guide the mind's eye. Consequently, not having the connected view of the great epidemic then that I have now, I found it imposible to lay down a principle of treatment. That mercury would salivate, and bleeding relieve inflammation I knew very well ; but the nature of the epidimic I knew not, and therefore this knowledge was not only useless, but dangerous.

Captain D's. fever continued to gain ground.* His strength and voice were rapidly failing, his appearance was certainly death-like ; all his friends expected a fatal termination. I changed the treatment, poured in the wine, and he lived,—and now lives, having been to Europe and returned. These are a few of the many living specimens of the success of the natural system of cure. It is unnecessary to swell the list with the recital of others ; if two or three suffice not, neither would hundreds.

In the application of these views, in the treatment of these symptoms more especially referred to in this place, as well as in general reference to the cure of fever, I have experienced extreme satisfaction. Previous to the time, however, when experience taught me the natural principles of cure, it was always with feelings of extreme reluctance, and uncertainty as to the means to be employed, that I pursued the treatment of any case of fever which might happen to occur.

The bark, in the absence of quinine, I gave in suspension in water, combined with aromatic spirit of ammonia and cardamums, or other aromatic in small quantities). The dose was 15 grains, more or less, every quarter of an hour; the patients were allowed to take their hot drinks; the effect of the bark is thus increased, and its passage along the tube is assisted,it does not produce nausea, and less requires to be given; if it acts on the bowels, it signifies not, it is only another of a thousand proofs that drastic purgatives are contra-indicated in these fevers.

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* The fever was contracted while on an excursion in the valleys bordering the Neilgherry mountains ; and which fever is said to be very fatal.

The principle of cure depends on the induction of the arterial diathesis, and the consequent flow of natural perspiration before the return of the period of the febrile paroxysm; the natural actions of the system are restored, which are incompatible with the existence of that condition the fore-runner or first stage of fever, (viz. the thickening collection and stagnation of the blood in thevenous system); when the natural actions of the system are not thus restored, before the return of the periodical term, then this thickening, &c., reaches its acmè, and the commotion occasioned during the transit of this blood through the middle passage, calls for the abstraction of blood for its relief. This is the history (comprised in a few words) of bleeding in the cold stage, a subject which has occasioned considerable dispute, but need not have done so had it been viewed in this light. It will be perceived, therefore, that, by one method of cure,the disease is prevented from returning, by the other it is allowed to commence, to be relieved by venesection. By one plan we produce a natural cure by perspiration, by the other it is proposed to cure by the abstraction of blood. Now to place the two plans before the general reader, that he may judge for himself, let him imagine himself on the journey overland, across the continent of Europe, and that he has to traverse many districts extremely abnoxious to ague, in each of which he will be certain of having an attack, and then ask himself whether he would pursue the natural doctrine of cure depicted in these pages, or merely provide himself with a solitary lancet; I fear it would prove a cheerless and helpless companion.

But, to return back to the errors of the present day; the treatment of fever consists, as I have repeatedly mentioned, especially in speaking of cholera, in a blind adherence to particular doctrines, to the complete exclusion of that natural view of the actions of the system in health, by the study of which alone the actions of disease can be explained. Consequently, we find volumes daily launched forth to the world, upholding venesection on the one hand, or abusing it on the other; praising cinchona in this volume, or vilifying it in another. What is the young physician to do? if he trusts to one to the exclusion of the other, he soon finds, to his dismay and remorse, that he has been deceived :—changes he his practice and clings to the other, behold his distraction at the death of his patients! It has been humbly endeavoured in these pages to expose the errors of the prevailing system, by the exposition of the epidemic according to natural principles; there is not a dogmatical adherence to sect or system, but nature has been strictly followed as the only sure and certain guide, and the principles of cure founded thereon throughout all the stages of the opidemic, from the collapse of cholera to the acmè of continued fever

The tenor of the foregoing remarks has been repeatedly illustrated throughout the work, but I have referred to it here again, because it cannot be too often impressed on the mind. In a word let it be recollected, that, while venesection or leeches relieve superadded symptoms for the time, the administration of bark, quinine, &c. will prevent the periodical return of the paroxysm. I cannot set any limit to their exhibition, the quantity necessary in each case will differ according to the habit of the individual and obstinacy of the febrile diathesis.

In a case of remittent fever, in Goomsoor, quinine was a dministered to the extent of 100 grains during the day, the skin became cool and the tongue improved; but, on asking the patient if he had any ringing in the ears, he replied in the negative. Astonished at this reply, I continued the quinine (*since the return of the paroxysm is preceded by an absence of noise in the ears,* and I supposed that it was about to return), having taken 24 grains more, I again asked him particularly, he replied he heard a slight noise all along, but it had not attracted his attention till the second time of asking.

Twice this quantity of quinine has been given: see Good.

The effect of the bark is not so permanent as the quinine, but it is encouraged and increased by warm and nourishing diluents. Its influence is destroyed by a heavy meal. It is an object therefore of the greatest importance, in the treatment, to omit the usual meal till after the period of expected paroxysm is past. For instance, in quotidians, the meal should never be taken before 12 o'clock, in tertians and quartans never before the evening. *The system should be kept under the influence of the bark (or quinine as the case may be) at the respective period in question;* the allowance of warm diluents will increase the effect, and be amply sufficient in the shape of nourishment for the time being.

The tongue is always white in intermittent fever; the whiteness disappears under the use of the quinine.

When there are superadded symptoms, that is, organic derangement, the tongue betrays the same, it is red, firmer, and often gristily in the centre, indicating a tendency to a continued form. The additional symptoms present will point out the organ affected, which will be removed by general or topical bleeding, and a free allowance of diluents;—and, the tongue becoming softer, the quinine, or other bitters will prevent a return of the febrile tendency; and the sooner this is done the better, the constant repetition of paroxysms daily induce these organic lesions of infinite variety which are so frequently to be met with. Into the consideration of these, I do not propose to enter. It is to be hoped that, ere long, they will seldom be met with; and that we no longer will hear of fever recurring every day for 30 days in succession, and ending in the spleen resting on the pubis; or of officers in the prime of life with scracely a tooth in their head (from the effects of mercury;) still suffering from their ague, and at last obliged to go to Europe.

In the severer forms of remittent and continued fever, the same general principles must be adopted. We have it always in our power, by the abstraction of blood either topically or generally to relieve the urgent symptoms, and the free exhibition of diluents speedily enables the system to perform the depurating process, and relieve itself of the febrile diathesis.

The fluids being in quantity also pass down along the whole tube, the *natural* peristaltic motion is again brought into play, and,if there are any irritating materials present, they are thus certain of being carried down by the natural action of the canal. The mucous membrane is thus not injured by irritating purgatives, which, instead of permitting of absorption, actually induce a discharge from that surface, and tend to lay the foundation for those dysenteries and diarrhœas, common terminations of the fever.

The most grateful diluent is the common effervescing draught, the materials for the preparation of which can be obtained in any quantity, and for the merest trifle. Nature appears to spread them out before us for the cure of the disease. While the transpiratory process is established after this method, the remedy, according to the quantity, can be made thus to act upon the bowels; its exhibition being all the while agreeable, and eagerly demanded by the sick.

The abundant diffusion of the volatile alkali enables its important agency as a diaphoretic to be constantly available; and, although the valuable effervescing citrate* or acetate from the carbonate is not so available, yet, the alkali in solution may always be procured from the sal ammoniac; and, in obstinate cases, with much debility and a dry skin, its free exhibition with copious diluents should never be omitted. To effect the object in view, no limit can be set to the exhibition of simple diluent diaphoretics: the desire of the sick is the best guide; the thirst, the index of necessity, should be gratified; nature is the best physician.

If the principles displayed in the foregoing remarks be adopted, there will seldom be occasion to have recourse to stimulants in the subsequent stages.

(I must here, however, allude to those cases which sometimes occur, and which are extremely liable to mislead the practitioner. These are cases which have not been seen at first, and therefore the particulars of which have not been presented to view. The pulse is quick, the skin more or less hot, extreme anxiety of countenance, restlessness, *constant jactitation,* and a sense of approaching death; the *bowels have been or are loose*, the motions more or less fluid, *destitute of bile.* It is in cases of this kind that the exhibition of wine is instantly and imperiously demanded; it should be given in the form of weak-mull as hot as can be drank: the patient soon after falls into a profound sleep. It is almost needless to say that in these cases, drastic purgatives with venesection are always fatal.)

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* Citron, lime, orange or other juice can always be procured. The neutrality of the draught can always be insured by trying a little of the acid and alkaline solution before hand, and then prescribing in proportionate quantities. If it is an object to act on the bowels the acid juice can be increased.

Nor will there be much occasion for recourse to mercury; its action can at all times be commanded easily and effectually by fumigation, thus obviating its exhibition by the mouth,in enormous quantities, and in the worst cases, ineffectual, necessitating the after employment of mercurial inunction. A few grains of blue pill inhaled, in a state of sublimation, will produce the effect of ounces taken into the stomach. Indeed, mercury may be given in almost any quantity when the intestinal canal is deprived of fluid; hence those distressing salivations that occur after stimulating draughts have been exhibited to support the sinking patient. The mercury, all this time, has been lying in the stomach and bowels, and never acts till fluids have been absorbed into the blood and relief obtained; thus, showing the importance of diluents, as affording the relief and not the mineral. I have frequently seen the sore mouth come on, after the lapse of two days of perfect convalescence, while the patient was congratulating himself on having escaped it.* The reason is perfectly obvious, it was unnecessary, and, as colomel is not absorbed, it lies in the stomach as at first taken; when, however, the actions of the system begin to be restored by the aid of diluents, bitters, &c., then, by the circulation of the fluids, the mineral is constantly brought into contact with fresh portions of the alkalies in the secretions,and is reduced to the black oxide, and some to the metallic state, and begins to be absorbed, and to act on the system at a time when least required, because relief has been already obtained; the reduction, absorption, and action of the mineral are all secondary, and throw the patient again back to indure the protracted torments of salivation.

The few foregoing observations would appear sufficient to illustrate the physiology of the febrile movement, and the corresponding principle of treatment that is indicated in the cure. To descend into the labyrinth of minute detail, would require volumes many times larger than the present, and which would necessarily be composed of much that is already known, and obtainable in the works of innumerable authors. I have contented myself with adducing the four following cases of fever, as further illustrative of the preceding observations, and have marked with italics those passages particularly exemplifying the coincidence of symptoms. I have refrained from allusion to many valuable medicines, often advantageously had recourse to in the treatment of fever, for their consideration would lead to an endless repetition of associated circumstances: among the most important of these, I may, however, mention

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* See Captain L——'s case, page 100.

Opium, the influence of which is often powerfully beneficial. I have never seen any bad effects, but always decided advantage follow its exhibition at the proper periods. It also possesses other properties as remarkable as its anodyne, and obviously indicated in all diseases of diminished vitality.*

In the absence of quinine, the exhibition of an opiate followed by diluents to determine to the surface will, in almost every case, prevent the accession of the expected paroxysm. In what is called the Nagpoor bilious remittent, I gave opium largely ten years ago, and, with marked advantage I took it myself, too, at that time, for the treatment of the fever I had, and, with decided benefit The case (in the sequel,)of malignant autumnal remittent may be considered an example of those in which its liberal use must always be attended with benefit; removing the anxiety, preventing that constant jactitation, and procuring profound repose from which the individual awakes an altered person. In this case, however, its benefits do not appear to have been considered; but the confectio Damocratis was luckily exhibited towards the last, and the benefit resulting was striking, which Dr. Good did not seem to be aware, was owing to the opium which, the confection contains, for he exhibited the nostrum on empirical principles.

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* One of the most extraordinary features in this vast establishment is presented by the opium tanks, in some of which, at least 1000 cubic feet of opium are accumulated in one mass. Though exposed to a damp atmosphere, at the mean temperature of 90°, still no putrefactive fermentation takes place. It is remarkable, too, that, though the smell of opium can be recognised half a mile from the factory, and though among the multitude of men and boys there employed, there are necessarily many opium eaters, still the people are all healthy, active, and robust to an unusual degree, and some of the oldest men in and about Patna, are workmen of the establishment, and have been engaged in its duties for many years.

The factory and its precints are, the favorite haunts of snakes of several kinds: whether allured by the drug or otherwise, it is difficult to conjecture. *Manual of Chemistry, by Dr. W. B. O'Shaughnessy, Calcutta,* 1837.

The muriate of morphia has been reckoned the most valuable of the preparations of opium; and the quinae hydroferro-cyanas the most celebrated of those of quinine. *One grain of this salt, given an hour before the accession of an intermittent, is stated by Dr. Gowzel of Antwerp, to have perfectly cured the disease.*

I must here state, however, that I have seldom or ever seen the exhibition of laudanum attended with any but decidedly beneficial effects when given under proper circumstances.* It is not likely, indeed, that it would be so universally in common daily use, and have such a high popular character, if its effects were those of headach and other morbid symptoms.

The efficacy of the hydro ferro cyanate of quinine may in part be substituted by the exhibition of the preparations of iron in combination with the free alkalies; they are more or less procurable in every situation; (the fresh oxide is liberated and a neutral harmless salt formed).

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* From some trials recently made in Europe it seems, that narcotine may be employed advantageously in the treatment of intermittent fever, *Dr. O'Shaughnessy's Manual of Chemistry.*

Since these sheets were sent to press I have learned from Dr. O'Shaughnessy that the muriate of narcotine (prepared at the laboratory at the Medical College) has been used (lately in Calcutta) with complete success in the cure of agues which had resisted every other mode of treatment. It was given in large and repeated doses without any unpleasant symptoms. I tasted the preparation, it is extremely bitter, with much of the flavour of the fresh plant.

The above strengthens what I have said regarding the use of opium in fever, both in my own case, and in the cases of others. I have always seen *its judicious use* accelerate the cure.

Now, however, that the muriate of narcotine has been extracted from the invaluable drug, there need be no longer any hesitation in having early recourse to its assistance, in subduing the repeated paroxysms of intermittent fever.

"Narcotine is very abundant in opium, especially in the East Indian, and consequently deserves much attention. It occurs in snow white crystals resembling sulphate of quinine, and of peculiarly soft texture and lustrous aspect. *It is not possessed of narcotic properties*, is insoluble in alkalies, and unaffected in color by nitric acid, or muriate of iron."—*Ib.*

I have seen the preparations of iron remove the periodical tendency to exacerbations of fever when every thing else failed. An instance in point among many, I will relate.

An officer stout and robust (27 years in India) was seized with the epidemic influenza last year. The symptoms were continued pyrexia more or less, with an exacerbation every morning on rising; there was a catarrhal affection of the air passages; great debility attended. Tartar emetic in small doses was tried; it both vomited and purged slightly, and the symptoms were all aggrevated *(in accordance with what I have already said in various parts of the work.)* Quinine was tried, the paroxysms however returned next day, and attended with excruciating headache at the same time. The headache and the fever came on in the morning, *on rising to stool*, almost as regularly as the day came, and continued all day, going off in the night, and returning again in the morning with the fever. It was so bad one evening that 30 or 36 leeches were applied to the temples; the headache was relieved.

This case puzzled me much. I did not bleed from the arm, because the headache being a secondary symptom, and depending on the return of the fever, (as I have endeavoured to point out) would return again with another paroxysm, *and it unfortunately did return on rising next day (and while at stool)* worse than ever: (the headache was from temple to temple across the expansions of the schneiderian membrane, form which there was a copious discharge during the continuance of the same, and with which it appeared to be connected.)

I now directed the exhibition of the carbonate of iron (which was the only preparation I had by me at the moment) it was given in repeated large doses at intervals throughout the day, warm nourishing diluents were freely allowed, with wine negus at night if desired, and the patient was directed not to rise from bed next morning, and above all to avoid, or at least not to encourage the tendency to the evacuation from the bowels (during which the paroxysm had always returned).

The paroxysm did not again return (nor consequently the headache;) a more permanent colour was restored to the countenance, and, in a few days, there was a complete restoration to health and strength.

This case, therefore, belonged to the great epidemic family which I have been endeavouring to illustrate; the secondary symptoms are often such, that it is extremely difficult to recognise the epidemic diathesis. This will be perceived in the foregoing instance; a repetition of the tartar emetic, leeches, &c. would have doubly aggravated the symptoms, and the features of a remittent typhoid would have been established. Severe measures in epidemic catarrh have not diminished the great mortality. The "*cautions* tract of Sydenham" is found to be of all the best. The foregoing case was one which, from a beginner or tyro would have met with the usnal common severe measures had recourse to in inflammations. The individual was tall, robust, with a ruddy complexion; and with the febrile diathesis, catarrh and headach, the case would have frightened a beginner. There is an *apparent* anomaly in this casewhich I must explain, since it might appear, to a superficial observer, that the views have not been strictly followed out according to the principle laid down throughout the work. This anomaly consists in not following up the cure with the quinine. Now, its omission entirely arose from the circumstance of the patient attributing his headache to it; but the return of the fever, the catarrh, and the tendency to stool all occurring and preceding the headache pointed out to me the nature of the case; and to prove it I exhibited the iron which had the beneficial influence already mentioned. Therefore, as the quinine was not repeated, still the cure was carried on upon the principle to which I have endeavoured to direct attention These views are not confined to a particular remedy, but to a particular principle, and this should be constantly kept in view by the reader; he should recollect that the deficiency of iron in the secretions may be often as prejudicial to health as the deficiency of the bitter principle and that the restoration of either will obviate the tendency to disease depending thereon. Hence the efficacy of the quinæ hydro-ferro cyanas, which I would have exhibited had I had any in my possession: wanting it and others, I exhibited the one that was most conveniently and readily procured at the time, and one that has been highly extolled in tic-douloureux and other periodical diseases from the days of Cullen downwards.*

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* Thomson.—It is the carbonate of iron which is contained in chalybeate waters held in solution by excess of carbonic acid.

In the abundance, however, of the sulphate of iron (green vitriol)* and the alkalies, means are constantly afforded for the exhibition of the protoxide of the metal, or the peroxide by heating the former to redness.

In the absence of cinchona and quinine, the indigenous bitters and aromatics of the particular locality will, in the majority of instances, afford equivalent substitutes.†

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* Sulfate de Fer. (F) Unna Baydie (TAM), casis (Hind), Heera cashish, (Duk) Taroosee(Malay), Zungarmadenee (arab),Tootya Subz(Pers) Thomson.

† If quinine is not at hand, neither is it likely that piperine, or salicine will, therefore, to these and many other preparations I have not referred. These two last, indeed, I have not myself tried therefore can say nothing of their effects they are, however, with various others highly extolled. But in the universal abundance of febrifuges, the cure of fever is always insured upon the principles which I have endeavoured to explain.

Dr. W. B. O'Shaughnessy states that the "piperine has been tried in the cure of the fevers in Bengal but found to be altogether inert and not to be depended on;" yet in England it was said to surpass quinine.

The decoction of the berries I have always been in the habit of prescribing as an assistant in inducing the diaphoretic effects of quinine: this it does in a very effectual manner, and it is eagerly desired and particularly relished by the sick; it is the well known *native* mellaghoo-tanee in such universal estimation; under its liberal allowance the quantity of quinine necessary to effect the cure of fever is much lessened; and the index of this is not only displayed in the profuse diaphoresis, and continued transpiration, but as the tingling in the ears is thus speedily induced, more need not be taken than necessary; whereas when the solution of quinine is given cold in solution, *much more than necessary may be taken*, which is ascertained on taking a meal or liquids, sometime afterwards; therefore I am always in the habit of prescribing warm diluents during the exhibition of quinine in order that its effects may be developed as it is taken. To illustrate what I mean, suppose two individuals expecting the fever in half an hour, require quinine to ward it off, the one who takes it in repeated hot aromatic draughts, followed, by a free allowance of the before mentioned warm carminative diluent, will soon be in a free and warm perspiration, while the other who takes it in pills or in a cold vitriolic solution will not escape the fever. In fact I have actually known the cold acid

Too much dependance should not be placed upon particular remedies, more benefit will result from the adoption and fulfilment of general prniciples of treatment.

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solution hasten the paroxysm. This method of administering qninine is not according to the natural doctrine of the epidemic in the first place, and in the second it is unnecessary, because boiling water completely dissolves the quinine.

Regarding the first, the deficiency of the alkaline diathesis in the first stages of the epidemic ought to point out the unnatural tendency or character of that system which has the effect of increasing that condition, and, above all, the application of the repulsive acid draughts to the nervous expansions of the pneumo-gastric and sympathetic congeries of ramifications, must, of all things, be the best calculated to induce the development of the first stage of the epidemic ; because these nerves are the machinery by which are displayed (or brought into action) those movements which we perceive to be developed on the first accession of the epidemic, whether in the convulsions of cholera, or the minor spasms, sense of suffocation, chattering of the teeth or shivering in ague ; and hence whatever tends to set this machinery in motion must be prejudicial. Witness the effect upon an infant of such a draught, and what I wish to inculcate will be perceived, the contractions are not confined simply to the immediate expansions of the pneumo-gastric, sympathetic, and ninth nerves but both the inferior and superior extremities partake of the general and repeated orgasms that follow. In a word the febrifuge should be given in the way which will be least offensive to the nervous expansions ; it is almost superfluous again pointing out the superiority of the mode of administering it in a warm sweet aromatic diluent.

Given as I have directed, there will not be another return of fever ; given cold (or in pills espccially) there may be several returns before the fever is fiually cured. From my experience in fever I consider (with quinine and all appliances and means to boot) that practice most unsatisfactory, most culpable, and most injurious to the patient, which allows of repeated attacks of ague, (except under extraordinary and very unusnal circumstances.) The cure with quinine will therefore be perceived to rest as much on the method of prescribing as on the remedy itself ; hence I have often seen the *bark* and quinine fail from an ignorance of the principle in question.

The abundance of subacid fruits of all descriptions affords an easy means of preparing the effervescing draughts and other various kinds of diluents, so necessary in the treatment of the different forms of the epidemic. That most important of all nourishing diluents whey,

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I have seen for instance subordinates in medical charge of detached posts in the Coromandel jungles with a sick list (of from 50 to 100 and more perhaps) treating the fevers with one or two ounces of infusion of bark twice or thrice a day.) Whether the quinine or bark are present or not, the principle should not be departed from, that is, those means above mentioned must be steadily pursued to bring about that change in the system ending in free and warm perspiration before the period of the accession of ague. In other words, the blood must be thinned, to enable it to pass the middle passage and establish the arterial diathesis, a condition incompatible with the development of the first stage of the epidemic, or the venous diathesis.

To recapitulate, the quantity of quinine necessary to cure ague will, under the natural system I have displayed, perhaps not be half of that required under a system of pills or cold acid draughts.

Since these sheets went to press, I have been indebted to the kindness and liberality of the secretary to the materia medica committee of Bengal for the following interesting information regarding the muriate of narcotine. It will be read with interest by all, and the remedy being of such importance, and likely henceforth to prove a powerful agent in the alleviation of the general distress among the poor (caused by the constant and universal prevalence of epidemic fever). I have also given Dr. W. B. O'Shaughnessy's simple mode of preparing it, that those who have the means may not want the way of being serviceable to their poorer brethren. The muriate of narcotine was prepared by Dr. W. B. O., and distributed among several medical practitioners for trial. They all concur in speaking in high terms of the remedy, some more than others ; their reports are valuable and interesting ; I have extracted from the longest one the principal features displayed in the consideration and trial of the new remedy.

" Dr. Roots and Mr. Jetson had proved the utility of narcotine in mild English ague, and had disproved its alledged poisonous effects, but whether it would prove similarly efficacious in the obstinate agues of Bengal, and, above can be instantly and readily prepared by boiling the milk with any of the subacid fruits; it acquires a freshness and flavour peculiarly agreeable to the feelings of the sick, as it is advantageous to the system; and its laxative quality (when this is an object) can be as readily obtained by increasing the quantity of the vegetable juice.

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all, whether we might venture to substitute it for quinine in the intervals of remittent congestive fever, remained altogether open to investigation."

The following is an extract from a letter on the effects of the narcotine in fever—from Dr. D. Stewert to Dr. W. B. O'Shaughnessy.

"I enclose for you the detailed histories of nine cases in which I have employed the muriate of narcotine, which you furnished me with, of these six were Europeans, one Armenian, and two Bengalees. The note of the former cases were kept by the patients themselves, who consented very readily to try the medicine, knowing it to be a new remedy prepared by you. Five cases were fevers of the tertian type, two quartans, and two remittent congestive fevers; you will see from the details of the cases that quinine had been used previously in most of them, with various effects, but in three with aggrevation of the symptoms, and the induction in one case of permanent deafness, in another with spleen enlargement.

From the experience of the whole I think I am warranted in concluding that the muriate of narcotine is a perfectly safe agent to any extent, and in large or small doses, that as a substitute for quinine it is unexceptionable and possesses over the latter many attributes which render it both a safer and more generally useful remedy in all the fevers of Bengal.

1st. In small doses it proves antiperiodic if given in the intermission for some hours before the expected paroxysm.

2d. In ten grain doses it is powerfully and immediately sudorific and antiperiodic.

3rd. It does not in such doses accelerate the pulse, nor exalt the sensibility of the nervous system, it does not interfere with the action of the medicines; it does not constipate; it never produces giddiness, or disturbed viscera, it does not produce nor increase determination to any particular organ, or to any already diseased or irritable viscus.

4th. It promotes *all the secretions*; and seems to act equally and generally on the whole capillary system, without depressing the vital powers, which it rather sustains meanwhile.

Equalling in abundant profusion all these, is the important substance in the treatment, the alkali. This is a no less important constituent of the animal secretions than the bitter principle itself, and the bounty of providence has consequently decreed, that it shall not be less abundantly diffused than the other necessaries of life.

5th Its action is maintained by the application to the blistered surface."

From the above the reader will derive much information. The detail of the cases would have afforded more, but the limits of this essay preclude the possibility of their insertion; besides, I have already trespassed too much on the liberality which has thus afforded me the opportunity of extracting what I have. I may only mention that the muriate was given (in one case,) by Dr. S. to the extent of 50 grains in 10 doses at intervals before noon: each dose produces a tingling glow and perspiration. In other instances it was given in smaller doses, and lesser quantity, for the cure.

In December and November previous, the narcotine was tried in many obstinate cases of fever (by the students at the Medical College) with success, in 2 cases of which the quinine had failed.

In a very severe case with success by Dr. R. O'Shaughnessy; regarding which instance it is remarked " In this case the narcotine certainly acted with equal, if not superior power to the quinine, though neither were adequate to effect a permanent cure, and to preserve the patient from the poisonous miasmata amid which he resides."

PREPARATION OF MURIATE OF NARCOTINE.

Take of Bengal opium..	2 lbs.
Alcohol....................	20 ,,

Rub them well up together in a large mortar, adding the spirit by degrees until the opium is exhausted of its soluble parts. Decant the solution and press the insoluble part.

To the alkoholic solution add as much ammonia as renders the liquid slightly turbid. Distil from a common alemilic till 15 lbs. of the alcohol are recovered. Draw off the fluid from the still and set it aside to cool.

On cooling it deposits a mass of coloured crystals composed of narcotine, meconate of ammonia, and resin. Wash with water which dissolves the meconate of ammonia; then with one part of water and one drachm of muriatic acid which dissolves the narcotine and leaves the resin; filter; the solution, which is of a rosy colour, is to be evaporated to dryness.

Being such an important agent in the treatment of disease, I have given below the following notes regarding it, as also the different names by which it is known, and the method of preparing the carbonate; so that it may be commanded at all times and places in the treatment of the epidemic, more especially in regard to the preparation of the effervescing draughts with the vegetable acids.*

The muriate of narcotine thus prepared is a transparent resinous mass of a rosy colour, brittle vitreous texture, very soluble in distilled water and spirits, and intensely bitter. A beautiful crystalline muriate of narcotine may be prepared by precipatating the muriate thus made by ammonia, dissolving the precipitate in boiling alcohol from which the narcotine separates in fine crystals as the solution cools. The crystalized narcotine placed in a tube and subjected to the influence of a stream of muriatic gas combines with the acid while it retains its original crystalline form.

But this process, though more elegant is too expensive and elaborate for general use, and the non-crystallized muriate is just as valuable as the more beautiful product now described.

A seer of Bengal opium yields by this process an average of one ounce of muriate of narcotine, and also one ounce of muriate of morphia ; by the sale of the surplus of the latter the former would cost one rupee the ounce, or one fourth of what quinine at present costs.''

* Carbonate of soda, Dr. Thomson states, is found native in Hungary,Syria, Egypt, Arabia, Thibet, India, China, Siberia,and South America, on the surface of the earth, and, on the margins of some lakes, which become dry in summer.

A large quantity is annually collected from the Natron lakes of Hungary, in the vicinity of Debretzen; and from those of Egypt, situated in the valley Bhr bela-ma, near the Delta.

Native carbonate of soda is found in considerable quantity in a lake in Colombia near the Indian Village of Sagunillas, to the south east of Merida, called by the natives urao ; it contains one fourth more of soda than the trona of Egypt, and more carbonic acid than the artificial carbonate.

Dr. Spry states, in his Modern India, that carbonate of soda abounds in the Ghazeepore district ; and about a mile west of theEuropean stationthere is an extensive plain of it more than a foot thick. Sulphate and muriate of soda in small quantity are always found mixed with it. In the dry season it effloresces on the surface,in great abundance,and is called by the natives flos-asseae

The influence of arsenic in the cure of ague, is deserving of notice, and always worthy of remembrance in obstinate cases. I do not feel competent to explain its ratio operandi, in the same manner as I have

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or Sudgee-muttee. Lands impregnated with this saline substance, are known by the name of Assahur lands. This deposit is not connected with any sandstone, and is thirty-five miles distant from the nearest point of the greatest sandstone formation (Vindhya range) of the province of Bundlecund.

The district of Tirhoot abounds in saline deposits. These consist principally of the carbonate of soda, sulphate of soda, and muriate of soda, besides saltpetre. In some parts of Behar, the impure salt is a quarter of an inch thick.

Dr. Ainslie says some of the more enlightened *vytians* know well how to prepare the carbonate, from the earths which contain it, (and which abound in many parts of Lower India) such as *over munnoo* and *poonheer*,—the first called in Hindustanee reh mittie, in Canarese soula munnu, in Tellinghoo savittie munnoo, and, in Sanscrit ossara.

The soda prepared from the first mentioned earth is called in Dukhanie *chowr ke mutti ka nemuck ;* and that from the second *chowr ke pool ka nemuck*, the most common same of which in *valeiel ooppoo*, so named from the circumstance of its being employed in the manufacture of glass bracelets. In Tellugoo it is *gaz ooppoo*, and, in Sanscrit *kachil làvà num*. As it is found in the bazars, it is in regular whitish cakes about the third part of an inch thick. and appears to contain much muriate of soda. Carbonate of soda was found by captain J Stewart on the ground on the banks of the *Chumbal* river near the village of *Peeplouda*, just where the *Chumbee* and *Chumbel* join.

The impure carbonate of soda is called in

Tamul	Karum or Poonheer karum.	Malay.... ..	Charum
		Sanscrit.....	Sargica Sargikàshara
Hindee	Sudgee-muttee or Sagilon or Chinkaloon.	Arab........	Jumed chenee
		French......	Carbonate de soude
		German......	Kohlensaures natrum
Canarese	Sàjà càrà.	Italian......	Carbonate di soda
Tellugoo	Booniroo. Savittie munnoo ooppoo.	Dutch........	Loogrout
		Russian.......	Soda

Dr. W. B. O'Shaughnessy in his Manual of Chemistry states, that, in many parts of India, the carbonate of soda is found in great quantities at the surface of the soil. In the neighbourhood of Monghyr, in the kankar ravines of the Doab, in many districts of the Mysore and Travancore territories, this valuable salt exists inexhaustless abundance. The soil thus impregnated is called the Sudgee-muttee. It yields, by simple washing, an average of 50 per cent of carbonate, with from 10 to 15 per cent. of sulphate of soda. It is supposed to be attempted to do with the other remedies. It must, however, act in the cure of the disease on the same principle as it acts on a larger scale in rendering localities exempt from fever ; as for instance the vicinity of the mines in Cornwall;* and it is probable that it operates not only as an antiseptic in these cases, but as a poison to animal life, putting a stop to the constant generation, and decay of animalculæ that, in unhealthy localities, fill the air, the earth, and the water.

The cure of ague by arsenic affords strong proof of the correctness of the views I have taken of the disease. The catalytic agent of the epidemic constitution is destroyed by it, and the periodical return of the fever is prevented.

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associated with common salt, but none of the many specimens I have analysed contain more than a trace of that compound. Vegetable colouring matter, carbonate of lime, alumina, and sand, in variable proportions constitute the remainder of this valuable mineral.

The ses-qui-carbonate of soda is a natural production found chiefly in Africa, where it is called trona, and, in South America urao. It contains 2 eq. of soda, and 3 eq. carbonic acid.

PREPARATION OF THE PURE CARBONATE.

When treated with water, in the mode described at page 208, the saji-mutti yields its carbonate and sulphate of soda, and colouring matter. By evaporating the washings to dryness in an iron vessel, mixing the residue with one tenth of its weight of charcoal and heating it to redness, the sulphate of soda is converted into sulphuret of sodium, which, by further heating and slow cooling is changed into carbonate of soda. The colouring matter is destroyed also by this process, so that another series of washings afford a solution from which perfectly pure and colourless carbonate of soda can be obtained in octohedral crystals.

The *bi-carbonate of soda* is formed by passing a current of carbonic acid gas through *a solution of the salt, just* described.

Third.—To extract the salt from the saji-mutti the following directions are given in the same Manual from Dumas.

Put into a vat with a stop cock, as much of the earth as contains 8 seers of the salt; add 60 pints of water, in 12 hours draw off,—as half the liquid remains add 30 pints more and draw off in 3 hours, do the same a third and fourth time. The liquid is to be evaporated to dryness as directed above.

* Thomson, and Paris.

If the epidemic was of an inflammatory diathesis, arsenic would invariably augment the severity of the symptoms, as it does when given in inflammatory affections: but the reverse is the case in this epidemic fever, it prevents the return of the paroxysm whenever there is time for its exhibition; when there is no time for its exhibition, or when the constitution has been ruined by the exhibition of drastic purgatives, and the individual in the last stage of typhoid remittent, and the arsenic fails, it is no more an argument against it than against quinine, or any other remedy. It is indeed only a proof of the mistaken views of those who attempt to cure ague by violent emetics and purgatives and mercury, for after weeks nay often months of calomel till the teeth are falling out, and black doses till the mucous coat of the bowels has been scraped off, it is then found out that the fever returns more violent than ever, and that port wine, bark, and arsenic "*must be tried.*" There is no wonder that so many die of low typhoid remittent fever; the only wonder is that under such treatment, every case of common ague is not made to terminate in continued fever.

But to return to arsenic; it would be interesting to gain some more knowledge regarding the action of this substance in the cure of fever, than what I have mentioned regarding its antiseptic and poisonous properties and power of checking the generation of animalculæ in quantities inappreciable to our senses.

Now I have mentioned that the crassitude of the blood is the first morbid phenomenon that is presented in the history of the epidemic, and that a cure can never be accomplished till this is removed; I have shown that water, alkalies, and the bitter principle, &c. are all indispensable in order to restore the tenuity of the blood in the first instance and in the next prevent the return of the disease.

It will therefore immediately occur to the reader that if this is the case, arsenic will have a corresponding effect on the albumen, and that in this way it must prevent the return of the paroxysm, viz, by preserving the integrity of that body. Puzzled to account for the effects of arsenic and dreading least they would resemble the bicloride of mercury (which would have deranged the mode of expressing the natural doctrine of the epidemic, because the paroxysms of fever return under the influence of mercury, while their recurrence is prevented by arsenic, and thus their effects on disease would not correspond with their chemical affinity) I tried the albumen with arsenic and was glad to find that the effect thereon was as different from that of the bichloride as its influence in curing ague: the solution, instead of becoming thick and opaque, remained bright and clear.

It is satisfactory therefore in tracing the effects of medicine to find a resting place for the eye amidst the vast sea of doubt and uncertainty that encircles the healing art. From the point we have now reached, in this instance, we can perceive at once the cause of the beneficial influence of arsenic in the cure of the epidemic, while, at the same time, its prejudicial effect in inflammatory diseases is accounted for. While on the other hand calomel by decomposing the albumen and becoming itself reduced must have a tendency to produce that very diathesis which attends the periodical return of the paroxysms of ague, at the very moment that the system is under the influence of the mineral: and the same with the bichloride, but here the transparency of the albuminous solution returns on the preponderance of the alkaline diathesis, or by adding a few drops of ammonia, clearly illustrative of their respective injurious and beneficial agency in the treatment of the epidemic.

I have already alluded to the cure of fever by arsenic as depending upon its preserving the integrity of the fluids, and preventing their decomposition.

Its powers have been taken advantage of in the preservation of bodies for dissection; with its assistance, even in the climate of Calcutta, the body has retained *its plumpness and freshness* for days after death; in the Calcutta Medical Journals and in Dr. O'Shaughnessy's Manual of Chemistry the subject is thus alluded to.

" The experiment of the Italian physician was tried in Calcutta on the 9th March.

One pound of arsenic was injected in 12 pounds of water through the carotid artery, *six days after the operation there was not the least change in the body* perceptible, about the 7th the eyes lost their fulness and the lips and fingers began to shrivel. In a fortnight the limbs had shrunk considerably, but still not the least offensive odour or any trace of decomposition could be detected; on the sixteenth day the body was opened and its internal structure examined. The brain, lungs, stomach and intestines were as free from putrefaction as though the deceased had been alive but an hour before."

Even in death therefore behold the principle of cure displayed, in the preservation of the integrity of the fluids, (*the eyes retaining their fulness till the seventh day*). In the cure of fever the arsenic acts in exactly the same way, it establishes a tendency to the phlogistic diathesis, a condition incompatible with the continuance of ague. When symptoms of the same begin to make their appearance, it is time to omit the exhibition of the remedy.

It prevents the periodical tendency to decomposition of the fluids, first seen in that thickening of the blood, the forerunner of all the forms of the epidemic, when there is presented that blueness more or less of the surface, coldness of skin, &c.&c. It is this first stage that arsenic prevents; the integrity of the fluids is preserved, and they continue their periodical revolution, because they are enabled to pass through the *middle passage*. To illustrate the principle by reference to objects daily presented before us; let there be two parcels of milk, add to one a solution of arsenic (such as might be received into the system with impunity) and let them stand for a certain time; the milk with the arsenic will continue fresh and *fluid*, while the other will have become more or less thickened. Now still further may the principle be illustrated, for if these two portions be injected into the veins of a living animal that with the arsenic may be harmless, while the other will cause death when it reaches the *middle passage* because it is too thick to pass through, and will consequently obstruct the circulation. And so it is the same with the blood, it is thicker at one time of the 24 hours (as I have previously shown) than at another, more especially remarkable during the prevalence of the epidemic constitution, at the period I have repeatedly pointed out; and arsenic prevents this tendency from assuming an abnormal condition, and preserves the blood in that state enabling it to flow through thelungs; the paroxysms of ague are consequently prevented.

Nothing proves more strongly than the foregoing facts regarding arsenic, the truth of the natural doctrine of fever; for here is a violent inflammatory substance curing the most obstinate cases of intermittents that have resisted all other means of cure.

Apart from the treatment, but a subject of vital importance,* I may again refer to the use of arsenic as a prophylactic, as well as destroyer of the febrific virus

Where contagion obstinately adheres to a particularly place or apartment, the application of the solution of the substance in question will effectually destroy it.

Every one is acquainted with the nature of arsenic, and it is in the power of every one to procure it, its disinfecting and prophylactic powers have therefore only to be properly made known to be properly applied.

CASES ILLUSTRATIVE OF THE PRECEDING OBSERVATIONS.

CASE 1ST.

CASE OF MALIGNANT AUTUMNAL REMITTENT.†

" In the case of a young lady in her seventeenth year, whom I lately attended, the attack was slight, and no serious evil was at first apprehended. The pulse was about 90 in a minute, and rather small; *the bowels were relaxed,* the motions bilious, and the stomach suffered from nausea. A gentle emetic seemed to afford some relief to the stomach, *and a dose of rhubarb and calomel to the bowels, but the fever continued with a daily increasing exacerbation, for the most part at mid-day or soon after. The stomach again became irritable and sick, and the sickness was again connected with diarrhœa, but the stools were colourless and watery,* and nothing was rejected from the stomach but the diluent food that was swallowed. The skin was now very hot and dry, the pulse from a hundred to a hundred and twenty strokes in a minute, the nights were passed in *perpetual jactitation,* or in short and talkative dosings. Opium, rhubarb, neutral salts, diaphoretics, mild astringents, in almost every form and combination were tried with very doubtful advantage, and the first with evident mischief. Anodyne injections were of as little avail; but sponging the limbs with cold water, or brandy and water, which was employed as well during the remissive as the aggravated symptoms, diminished the pungent heat, and for a time afforded some refreshment. Still the fever continued its career; the stomach retained nourishment with difficulty, *the bowels were daily teazed with six or seven watery evacuations,* the pulse was quicker and weaker, and the *nights without rest.* The heart at last became oppressed with a sense of fulness rather than of throbbing; the lips were considerably swollen, ragged and black; a hemorrhage occasionally issued from the nostrils and the fauces, and the general debility was greatly augmented, such was the appearance towards the eleventh day. The tongue was not much furred, *the pulse,* though small, and rarely under hundred and twelve, *was steady : but the heat was intense, and the thirst unquenchable.* The mineral acids in dilution, sometimes singly, and sometimes in the combined form of aqua regia, with accidental beverages, were now chiefly trusted to, in connection with ferinaceous foods, jellies, and beef tea; and cold water was permitted in any quantity. This plan was continued till about the eighteenth day; when every thing allowed being rejected, *and every evacuation accompanied with faintness,* it appeared to me that the plan should be changed; that the chief cause of irritation was at this time debility, and that a more stimulant treatment should be at this time commenced.

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* The smoke of large cities (as London, where the fuel consists of coals, and where metals are continually passing through the furnace) conduces to the prevention of epidemics. The existence of the two is incompatible. When the trade of the capital of the world shall decline, then will epidemics there reign supreme, and the city be depopulated. At present the percentage mortality of London is less than any city in the world.

Should the plague unfortunately again make its appearance in this country, there will be an apportunity afforded of putting the means pointed out inpractice on a large scale in those localities where it continues obstinately to rage with fatal violence.

† This is an ordinary case of common fever, like those of daily nay hourly occurrence, where the patient is reduced to deaths door by the treatment, *not by the disease.*

My colleages, for whom I have a high respect, acceded with reluctance, as conceiving that we should only exasperate the febrile symptoms; and that if the stomach could not retain tasteless things, it would instantly reject wine or convert it into an acid. The attempt, however, was made; *sound old Madeira was administered by tea-spoonfuls*, and shortly afterwards a small portion of chicken jelly. Both remained on the stomach; *but the diarrhœa continued*; and for this, as modern preparations had proved of little use, I recommended a scruple of the confectio Damocratis in half an ounce of cinnamon water, *after every loose motion. The diarrhœa ceased as by a charm; the ensuing exacerbation was less marked, the night was passed more tranquilly*, and colombo, in small doses of the powder, was commenced the next morning, and persevered in. The change of treatment being thus found to succeed, was adhered to, and the patient slowly, but effectually recovered."*

Case 2d.

Lieutenant H. was attacked with *quotidian intermittent*, which, *in a few days, assumed the remittent type; the intervals distinctly marked*, and no alarming symptom at any time present. His *bowels had been freely opened at the commencement of his illness and were kept in a lax state throughout. On the sixth day*, he had sustained an attack of fever not unusually severe.

At 10 A. M. of that day, when I last saw him, his pulse was soft and moderate; the tongue clean, and a general warmth and moisture over the body: no confusion of head, no local pain, his spirits by no means depressed, and his mind perfectly clear. I ought also to mention that *his mouth had just become slightly sore from the effects of calomel* and antimony. He was directed to beware of cold and damp, during the sweating stage, and afterwards to refresh himself with a change of linen. This had been attended to, and, at 3 P. M., he was seen by a brother officer in a state of apparent relief and comfort after which it appears he fell asleep; and at six he was found in the same calm, sleeping posture, but,—*dead.*†

Case 3d.

Lieutenant E L. was taken ill with fever of the *remittent kind*, during my absence on duty at the shipping, and attended for me by a friend, in whose abilities I had every confidence. On my return, about the *5th dag of his illness*, I found him suffering from *daily attacks of fever*, but *more severe on alteruate days ;* pulse small and quick, tongue dry and coated, dull heavy pain of the head and back of the neck ; *bowels purged, mouth affected by mercury*, but irregularly, tenderness and spitting only existing during the periods he was free from fever. He *sank about the* 15th day, into a dull sleeping state, grew comatose ; breathing stertorous, eyes glassy, pulse small and quick, extremities cold ; and, after remaining about 12 hours in this state, expired.‡

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* Good's Study of Medicine.

† Grieson on the Endemic Fever of Arracan, transactions M. P. S. C., vol. 2.

CASE 4TH.

The following are extracts from a case of fever, related by Dr. Spry in his modern India.

The subject of the case had been complaining in the morning, and the extract commences at the time of Dr. S.'s visit, early in the day.

The headache was increased, and the indescribable sensations, which he alluded to *in the morning*, were now succeeded by a hot skin and quick pulse. No time was lost in reducing the arterial action by copious bleeding, and the administration of appropriate medicines. *By the evening the fever had again acquired so great a height as to call for the application of the lancet a second time*. The boundings of the pulse, although reduced, *would not be compl etely subdued, and the patient passed a restless night.* The second day there was an improvement, but unfortunately two friends dropped in, who kept him in conversation longer than was prudent, and at night he became delirious.

I was with him till two in the morning, keeping the head bathed in cold wet cloths.

The fever, on the third day, had gone into the secondary stage ; the lips were for ever on the move, but hardly a word could he distinctly articulated ; the skin was dry, and the pulse little better than a thread.

Recourse was now had to stimulants, such as calves foot jelly, and negus. The patient was allowed a spoonful as often as inclination led him to desire them. *He grew better and better. The delirium sub-*

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* Burnard's topography of Aracan, transactions, M. P. S. C. vol. 3.

sided; and on the night of the tenth day, he enjoyed a little sleep. The prostration of strength was excessive The strictest injunctions were therefore given, that on no consideration was he to be moved

The fever having left him for two entire days, he was pronounced convalescent. At ten o'clock I quitted him for the night, doing as wel as I could possibly expect. An European serjeant was left to sit up with him till day-break. About two in the morning a messenger arrived at my house, with a hastily written note from the worthy individual, who was residing in the same house with the patient.

I hastened as may be supposed, with all possible celerity to the house, in the hope that the alarm of the writer had been greater than the reality would justify. But, alas! it was too true; the patient whom I left doing so well at ten o'clock, was at two a corpse. It was evident that no ordinary event could have occasioned this distressing termination; and the examination of the man who was appointed to watch the patient, soon disclosed the cause.

" He fancied," he said, " that during the night the poor young man would like to have his shirt changed, so he lifted him up on the side of the bed, but, before he had been there a minute, he fell back again on the pillow." From this state of exhaustion he never rallied, and was now a corpse."

CASE 5TH.

The following case occurred lately during the prevalence of epidemic influenza in Calcutta. It would have been celled malignant by many (as case first.) I prefer it to numerous others I had intended to give, because it at once displays the principles of treatment, and their universal applicability whether at Calcutta or Cape Comorin. The subject was a servant of Mr. Macleod, (Bombay C. S) I found the patient " completely floored" unable to sit up from extreme debility, answering indifferently, difficulty of articulation, sense of suffocation, cough, dry skin, pulse small and quick, urgent thirst; he got effervescing draughts ad libitum, a few leeches to the chest; and quinine in large dilution with some wine was given during the night; next day there was an improvement.

The same system was continued with nourishing *diluents;* he rapidly recovered, and in three days was able to attend to his business.

CASE 6TH.

Mr. Dickson (a young gentleman arrived a few days ago from Europe) was seized with the common endemic fever, hot dry skin, rapid pulse,pain of head and back, weakness, nausea, and much thirst. The same system as in case V. was commenced; the effervescing draughts *often repeated* had the usual effect, perspiration took place, the system was cooled, and sleep succeeded (neither leeches or quinine were necessary.) On the third day he was well and able to go out and breakfast with a friend. The common system of the day in this case would have been, *venesection, tartar emetic, calomel, and black doses*; and Mr. D. instead of being now in rud ehealth could have been looking like death,with every tooth in his head ready to drop out.

Ranymoody Gully.
Calcutta, March 4th, 1838.

SECTION V.

DYSENTERY.

PHYSIOLOGY, PATHOLOGY, AND TREATMENT.

I have already described the extremes of the great epidemic, namely the collapse of cholera, and the acmè of continued fever. I have alluded to the vast variety of forms of the latter, and pointed to the frequent anomalous symptoms often presented in the former. Among these none so important as the softened and abraded condition of the mucous expansion in cholera; and this is the commencement of that disease which I am now about to consider. The violence of the epidemic influence at the onset of cholera crushes life in the bud (by the tension induced on the nervous expansions of the respiratory columns), as I have before explained, and therefore the ulcerations have not time to be established, so as to constitute that form of the epidemic called dysentery. In the sequel there is a case given, from which it will be perceived that, when cholera becomes protracted and proves fatal, the post mortem appearances of the mucous membrane cannot be distinguished from those presented by a case of dysentery. More than this cannot be said to show the relationship of the two. Dysentery then is a minor form of cholera, lengthened out, and presenting the ulcerations fully developed.

From the moment of the accession of the epidemic visitation the ulceration begins to be established, and by the time the patient is admitted to treatment the mucous membrane is a complete mass of ulceration. Individuals among the lower orders seldom or ever apply for medical aid till some days after the purging has been going on (see subsequent note). They do not apply till they experience pains in the bowels: this pain is occasioned by the extension of the ulceration, more or less, through the coats of the intestines; when the muscular, and particularly when the serous, become involved, then is the pain experienced in a more or less acute degree. The great mortality from dysentery is owing to this lateness of application; if recourse to medical aid was had on the first day of purging, few, if any, fatal cases would occur. When a case therefore of dysentery is presented, it should never be forgot that the whole mucous membrane is more or less in a state of ulceration, and that particularly the colon (from its situation) is already extensively and deeply involved therein. From this circumstance it is that under *excessive* depletion the individual never rallies: the severe shock paralyses the system, and the absorption into the blood of the sanies of the tube (from the ulcers) is encouraged, and hence the cadaverous smell emitted from the dermoid and pulmonary tissues. In several hundred cases of dysentery I never have yet seen violent measures attended with relief: if the patients did recover, they were long unfit for any employment, and were extremely liable to relapse by which they were speedily carried off. This is explained by what I have just said, viz, that the ulceration is already established at the commencement of treatment.

Like cholera, as I have mentioned, dysentery makes its severest attacks about the same period of the night; and its severity is often such that it runs on rapidly in violence and constitutes true blue cholera. Hence, as I have already remarked, it prevailed in England in the time of Willis with such intensity that death took place in twelve hours from the period of attack. It, however, is not so denominated now-a-days, but is, when it prevails in this severe form, distinguished by the name of cholera morbus.

The preliminary or premonitory diarrhœa *existing invariably* during the reigning of the epidemic constitution is the same in all the three forms of the disease to which I have alluded; hence in England (in fact all over the world) this premonitory diarrhœa was the forerunner at one time of cholera, into which it rapidly merged: at another the diarrhœa would continue obstinately (not running the length of cholera) but injuring the mucous membrane and inducing the symptoms of confirmed dysentery; in some situations, indeed, no other disease save dysentery appeared during the prevalence of the febrile term. At other times, and under circumstances of a milder epidemic influence, the symptoms of diarrhœa would be of a much milder character, while the external symptoms of the febrile re-action would be almost constantly developed, causing astonishment and wonder in the minds of those who did not regard this accession of varied symptoms after the natural method. They attributed them to a specific cause, and considered them different diseases, but having many points in common, concluding after this manner " thus far can we go in tracing the connection and affinity between cholera and influenza, the rest appears still involved in impenetrable darkness."

In dysentery the first symptom, as I have mentioned, is diarrhœa, and not the slightest judgment can be formed, at this period, of what will be the nature of the succeeding affection.

So slight are the first symptoms of the disease, that recourse to medical assistance is rarely or ever had till a longer or shorter period after the commencement of the premonitory diarrhœa.

The period may vary from one day to three weeks, and longer.

In a recent case of one or two days standing, the individual attacked generally states that his disease came on in the night, that he was violently and copiously purged, (and that he thought he had got an attack of cholera), that the purging has continued up to the date of his admission, with the additional symptoms of tormina and tenesmus, which two last have obliged him to apply for assistance.

In a case of longer duration, from 7 to 20 days, or upwards, the individual will make nearly a similar statement, with this difference of having been free from pain, and stating that he always thought the diarrhœa would wear itself out, but that it still goes on, that any thing he eats soon passes off, and that he has now a bearing down and falling of the gut.

In nine hundred and ninety nine cases out of a thousand the commencement of dysentery is more or less after the above manner. It at once points out the progress of the disease, and illustrates the dependent character of the subsequent symptoms.*

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* In 1826, at Madras, I saw several hundred cases of dysentery of the severest descriptions; they all commenced more or less after the manner I have described, in fact, at the onset many of them could not be distinguished from the commencement of cholera. I took a memo of a few cases of dysentery

Thus far then dysentery is to be associated with the premonitory diarrhœa of the epidemic constitution ; it cannot be separated from it in any possible way. It must be considered apart from the secondary symptoms, as these are in the other forms of the epidemic ; these symptoms in the other forms are superadded ; they may be removed, yet the disease may continue; and so the premonitory diarrhœa in dysentery may continue for weeks without the development of superadded symptoms.

In cholera I pointed to the consecutive fever as an instance thereof; and in dysentery I likewise have in the sequel adduced proofs of its terminating in fever, and assuming, like the cholera of Russia and other parts, a contagious character.*

We perceive, therefore, how the varied symptoms interweave and run into each other and presenting characters corresponding in every form of the epidemic, and in many instances even not to be distinguished from each other.

We have already seen that the consecutive fever of cholera in Russia could not be distinguished from an ordinary continued fever,

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in H. M. 30th Regt. and which memo, I find, is still forthcoming. From it I have given the following items bearing on the point in question.

James Too. private,	before admission,	purging	for	several days.
Thos. Welsh do	do	do	do	do.
William Ashfield do	do	do	do	fourteen days.
Francis Lee	do	do	do	ten days.
Corporal Muston	do	do	do	four days
George Shaw, Pt	do	do	do	three or four days
William Rhanaghan, do	do	do	do	six days.
Mathew Harewood do	do	do	do	three days.
John Kemberley do	do	do	do	five days.
Patrick Devellen, do	do	do	do	four days.
Henry Dolan, do	do	do	do	three days.
John Warren,	do	do	do	seven days.
James Skeen, do	do	do	do	four days,
Roger Ryan do	do	do	do	three days.
Robert Carr do	do	do	do	five days.
Jos. Elliot	do	do	do	ten days.
Patrick Stewart	do	do	do	ten days.

In all these cases, and many others, the commencement was generally in the night, at the same period as the attack of cholera. from which it could not be distinguished till time alone showed whether or not it would run into the grave and rapidly fatal form of the epidemic. The patients themselves indeed, in describing their symptoms, used to say that they thought at first they had the cholera.

* See head Contagion.

and that it was also contagious ; and we have also seen that dysentery becomes contagious when complicated with fever,* thus resembling cholera in these secondary stages, as it also did in the premonitory diarrhœa.

The severity and continuance of the premonitory diarrhœa are in exact proportion to the defective condition of the process of chymification, the result of the paucity of the secretions, and principally, if not wholly, of the biliary. The aliment passes down along the tube in the same state it passes from the stomach; it soon begins to undergo decomposition in consequence of the absence of the preserving fluid to which I have so often adverted; the intestines are more cr less distended ; there is a constant rumbling in the bowels. and repeated calls to profuse crapulent, *white* coloured, soft or watery evacuations. In 99 cases out of 100 nature herself would cure this condition, under the restriction of abstinence, more or less complete ; but man eats as constantly as he breathes, and while the febrile constitution permeats the tissues, the constant inroduction of aliment, in excess, contributes to the development and continuance of superadded symptoms.

The discharge of the indigested materials by the lower orifice of the tube, leaves the upper portions free from any traces thereof, and in these the scanty display of secretions still contributes to the development of a desire for food. The food is again swallowed, and in quantities invariably greater than required : the secretions are unable to assimilate the whole, the changes commence, gas is evolved, the abdomen becomes swelled, the mucous membrane again irritated by the contents of the tube, and it throws out a secretion to protect itself ; the contained mass of matters becomes more and more diluted in its passage downwards, and at last, is discharged in a thin, white crapulent diarrhœa.

The foregoing process is, as nearly as possible, the complete description of what takes place on the development of the premonitory diarrhœa. The absence of all ingesta from the upper portions of the tube does not encourage the presence of nausea or sickness in the early stages, and hence there is no restraint to the indulgence of the cravings of nature; the meals are observed as heretofore, but they are as constantly succeeded by the attacks of diarrhœa as above described.

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* See Index.

The continued repeated irritation, to which the mucous membrane is thus exposed, becomes at last fixed in different portions of the tube, giving rise to griping pains in different parts, as the contents of the bowels pass along, irritating them more and more.

At those parts of the canal, where the contents have greater difficulty in passing than in others, the irritation is consequently greatest, and post mortem examination displays a corresponding derangement of structure.

The principal of these portions, and the one almost invariably diseased, is at the end of the small intestines, and commencement of the larger where the parts are fixed, and where the contents of the bowels have to ascend. In this last mentioned place, (the caput cœcum coli) they consequently always accumulate, and as constantly cause pain and uneasiness as long as they continue in that cavity, and it is here, after death, that the greatest disease is found in ninety-nine cases out of a hundred.

Under the above circumstances confirmed disease soon becomes established, the villous covering becomes abraded, the blood vessels are exposed, more or less blood is poured out, and tinges the matter that are passed of a red colour.

Sometimes the blood is poured out in such quantity, and recent, that it forms a thick clot in the cavity of the gut adhering firmly to the abraded surface, and allowing the contents of the bowels to flow through the temporary tube it has thus formed. This new tube, however, soon becomes detached, it is thrown off by the contractions of the muscular parietes of the canal, and presents, on being discharged, the singular appearance I have just stated.

At other times the villous membrane, by the violence of the irritation, becomes, subsequently, itself detached, along with the cellular, and portions of the internal layer of the muscular, presenting the regular cylindrical shape of the canal, differing in length in different cases.

It is not often, however, that the disease becomes protracted to such a length as to admit of these phenomena; the tension that is unavoidably induced on the respiratory columns destroys life, previous to the development of the above mentioned features.

While certain portions of the tube, by reason of their relative situation, suffer more than others (from the diseased condition of their contents, the result of the defective chymification of the febrile diathesis), still the whole length of the tube partakes more or less of the disease, the consequence of this constitutional derangement.

The moveable nature of the small intestines, floating in the cavity of the abdomen, enable them, readily to propel onwards the semi-chymified materials that enter their cavity. Notwithstanding this, however, they do not escape injury, as manifested during life by the griping pains in the umbilical and hypogastric regions, and after death by the diseased state of the mucous glands in the ileum, and the abraded condition of the edges of the valvulæ coniventes in the jejunum and upper portion of the former intestine.

The colon, more fixed in its position, and containing large and numerous cells, affords every opportunity for the development of the diseased action, and the consequent train of sympathetic symptoms. The edges of the valve of the colon are rapidly affected and denuded of their covering, and its action consequently rendered useless ; and the extremity of the ileum in part, shares in the same ulcerating process already established in the caput cœcum and ascending colon. In these last, the destruction of the coats of the intestine is extremely rapid, and the disease there is constantly indicated by the pain universally present on pressing that part, particularly the caput cœcum.

The dorsal aspect of the intestine, at this part, wanting the peritoneal covering, is often completely destroyed by the action of its contents resting constantly upon it. The iliacus and psoi muscles, and the lumbar plexus of nerves are speedily involved in the extensive diseased action (and reduced sometimes to a black gelatinous-like mass), accompanied by excruciating pain in the direction of these muscles and down the thigh in the course of the crural nerve.

Along the colon the ulcerations are numerous and extensive on the edges of the cells, and along the ridges formed by the longitudinal bands, *they present three distinct rows.*

The more retired portions of the cells often escape the influence of the irritating contents of the intestine, and adhesions are frequently formed excluding it entirely from the cavity thus formed, which is found after death to be lined with healthy mucous membrane. This is particularly remarkable at the superior angle of the descending colon, where, frequently, a large portion of perfectly healthy mucous membrane is found.

As the lower portion of ascending colon is generally, indeed almost always, found the most diseased of that part of the intestine, so, in the descending colon, the lowermost part is likewise found to be the most altered of that portion. The contents of the gut here rest and produce disease as they did in the cœcum: the individual reluctant to suffer the pain and tenesmus attending each evacuation, refrains as much as possible therefrom; and the irritating contents are retained.

The organization of parts, however, is soon destroyed, and the action of the muscles about the anus paralysed; the sphincter and levator ani are completely laid bare, and the ulceration extends round the verge of the anus.

As might be expected, the bladder of urine, prostate gland, urethra, and muscular apparatus are involved in the disease, and strangury, dysury, followed by a purulent discharge, are the consequence.

Along the whole course of the colon the ulcerations are found in all stages of progress, and of various extent; their position is in a transverse direction along the edges of the cells, and are generally of an oblong shape, of varied extent in every different position. The depth to which they individually penetrate is also various in each; some merely in the mucous; others extending through the cellular; in others again the muscular has been penetrated, and the peritoneum forms the bottom of the cavity. This last membrane not unfrequently is found at these particular parts, of a black colour and disorganised, from which point peritonitis has extended more or less over the neighbouring intestines, glueing them together. In other instances, this spacelated black spot has given way, and worms, (large lumbrici,) and the sanious matter of the intestines, are found in the cavity of the peritoneum.

In other instances, where this disorganization has not gone so far, but where a stricture has been formed by the contraction and adhesion of the muscular fibres after ulceration, a new train of phenomena set in, and while the contents of the bowels were formerly carried downwards, they now are prevented, and regurgitate by the antiperistaltic motion. The gut from the constricted part upwards is distended more and more; water or other liquids descend with difficulty into the stomach, and frequently flow back again as soon as taken. Post mortem examination discovers the stomach enormously distended, filling the whole cavity of the abdomen nearly, and the gut filled with fluids down to the stricture.

Such, therefore, is a short sketch of the progress of symptoms engrafted on the premonitory diarrhœa, and constituting the disease termed dysentery. The disposition of the ulcerations affecting all the most prominent and projecting portions of the tube at once point it out as the consequence of defective chymification. The singular facts, too, of healthy portions of mucous membrane existing in the midst of this disease, in those parts not exposed to the influence of the alimentary matters; as also the protecting process of the gut, in forming adhesions to exclude these diseased contents from the cells, which are found to contain healthy mucous membrane, at once point out the epidemic consanguinity of the affection.

It will from these be at once perceived that the situation of the colon, explains many of the apparent anomalies of this disease, and that the partial exemption of its membrane from the ulceration, immediately betrays its secondary nature; and in no way differing in character from the extensive disease of similar parts found in the protracted profluvies in many cases of cholera; which is the very disease under consideration.

In cases of artificial anus, at the termination of the ileum, defective chymification occasionally takes place during the febrile diathesis, or epidemic constitution; the colon is present, yet remains altogether free from disease, because it does not receive the diseased contents of the small intestines, they are constantly discharged from the artificial opening.

From all that has been advanced, therefore, will be perceived the gradual development of disease, from the simple premonitory diarrhœa up to confirmed ulcerations penetrating the coats of the intestines, inducing inflammation, mortification, and death ; and, in other instances, a long associated train of consecutive diseases, in parts widely different from one another.

When this diseased condition has not extended too far, the restoration of the chylifactive process acts like a charm upon the secondary symptoms, all traces of them quickly disappearing.

But it not unfrequently happens that the ulcerations have too firmly laid hold on the mucous membrane, and continue, notwithstanding, the revival of the chylopoetic process ; they are beyond the influence of the sanative properties of the healthy secretions,and they begin, in their turn, to exert a diseased influence on the hepatic system.

The radicles of the portal tree, spread out upon the affected parts, are in immediate contact with the ulcerated surfaces, and necessarily imbibe the diseased secretions with which the neighbouring tissues and the ulcers themselves are infiltrated. These, in greater or less quantity, are conveyed direct to the liver, and not only influence its secretion, but give rise to obstruction, infraction, and imposthumes in the substance of the gland.

Thus we perceive that, while abscess of the liver may exist, previous to the development of dysenteric symptoms, it may likewise originate during the progress of secondary disease, as I have pointed out, as existing, in the same circle of vessels, at the origins or radicles of the hepatic tree.

The liver stands in the same relation to the hepatic system, that the dermoid tissue does to the arterial ; and if we perceive that a bad state of the blood produces boils and carbuncles in this last organ, it is not to be wondered at, when these same descriptions of boils are found existing in the liver ; when we know that the expansions of that organ are absorbing irritating humours from the surface of the colon, which humours, in dysentery, are from the very first, of an extremely offensive nature. The expansions of the vena porta, too, are frequently laid bare, and become open mouthed, and consequently the sanies must flow in a deluge on the body of the liver, and completely prevent the further secretion of bile.

The reduced quantity of blood must in dysentery give every facility to absorption, and in this as well as in cholera so great has been the deficiency that the vena porta has been found empty; we may imagine then how rapidly humours would be absorbed, and, permeating, irritate the hepatic tissue, to the establishment of imposthumes, by the formation of permanent obstructions in its minute ramifications.

The benefit of injections of liquids in cholera and dysentery depend upon their speedy absorption and passage to the liver, and the establishment of its function. Instead of having to pass through the long route of the general circulation, they pass directly along the vena porta. If these injections therefore so readily excite the liver, we need not wonder at the influence that the diseased surface of the colon must have upon the same organ when it is in fact a part of that organ, and the most important part of the whole.

When we hear of disputes, and read of long disquisitions in books, about the liver being or not being affected in dysentery we perceive that the writers are not aware of the physiology of the internal tree; that they do not perceive its complete resemblance to the vegetable, and that its circulation is distinct and altogether different from the animal; and that this circulation is constantly carried on independent of the heart, &c. exactly as we perceive in the moving circle of the juices of plants; and that in dysentery the most important part of this tree is affected, keeping up extended disease in the whole hepatic circle.

I have now pointed out the train of symptoms arising from the effects of epidemic influence in another part of the work, and, amongst these disease of the primæ viæ, or dysentery, the subject under consideration; we hence perceive the constitutional origin of these local affections, first ulceration of the radicles, next disease of the expansions of the hepatic tree.

Abscess or abscesses may exist in the liver with impunity as long as they continue to occupy the same space as the portion of the gland implicated; and as long as the secretion of bile is in sufficiency for the purposes of life. Under these circumstances it is impossible to determine the existence of an abscess. It is often discovered after death, when the individual may have died of other diseases.

When dysentery commences by slow degrees, is extremely obstinate, and not relieved by either topical or general means, there are strong grounds for believing in the existence of an abscess in the liver, provided there are no sufficient cause to explain the deficiency of the biliary secretion such as previous disease, intemperance, age, &c. &c. &c.

In epidemic dysentery, as in epidemic cholera, we cannot, from the suddenness of the attack, reconcile to our minds the idea of *antecedent* abscess.

To the complication of dysentery with fever, I have already alluded, as also to its contagious nature; *see that head.* The dysenteric symptoms generally alternate with the febrile; the case is perplexing, obstinate, and often fatal, especially if the membranes have been deeply ulcerated. The affection of the bowels is frequently worse during the night, while the fever prevails during some portion of the day.

From the foregoing physiological and pathological history of the progress of the disease may be readily inferred

THE TREATMENT:

That ought to be pursued.

The most dangerous symptoms should be first attended to and the application of leeches to the abdomen be had recourse to. These are preferable to general bleeding because it so seldom happens that the recent disease is met with; it has generally been going on from several days to a couple of weeks and longer. Leeches always afford more relief than venesection, the disease is topical, it is an engrafted superadded symptom. Cases no doubt there are requiring general bleeding, such for instance where the symptoms are recent, attended with a febrile diathesis, and the individual robust and plethoric. But even in these the general abstraction of blood must be cautiously practised, for the extensive ulceration as I have remarked, is such, that under excessive depletion, it will never assume a healthy action, and the process of chymification will be completely paralysed. This I have repeatedly seen, where after two successive copious bleedings from the arm, the cadaverous aspect was established and the individuals rapidly sink under the united influences of extensive, deep ulcerations, and the excessive depletion.

Leeches on the other hand are almost always attended with decided advantages, and they should be followed up by the exhibition of ipecacuanha emetics *plentifully diluted.** I know no other medicine that has such a decided influence (at first) on the disease. I have frequently seen emetics cut it short themselves without any additional treatment. They appear to act by determining the secretions from both chylopoetic viscera into the intestines, since their exhibition is generally followed by motions of a more bilious character than had, for some time, been passed; and unattended by much tormina or tenesmus. They likewise induce the contraction of the whole tube, and thus is there not only afforded a less surface to be acted upon, but there is less chance of any unassimilated materials resting in any portion of the canal. This contraction likewise renders the mucous membrane much less vascular, from the calibres of the blood vessels being reduced in size. This is exemplified in the different states of the mucous membrane of the stomach when distended and when empty, as pointed out by Mr. Beaumont; and in the appearances presented by the different vascularities of these respective conditions after death, in the different muscular cavities.

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* Ipecacuanha, when received into the stomach, remains there for longer or a shorter time without inducing any perceptible effect. When its active principle becomes disengaged, then an irritation is established on the mucous surface of the stomach, and the consequent affection of the pneumogastric and sympathetic nervous expansions becomes developed, presenting the train of symptoms we perceive to follow the use of the remedy.

This is the specific action of the substance in question, when it is continued longer the irritation ends in a vesicular eruption on the mucous membrane. This vesicular eruption is also induced on the skin when the moistened powder is applied thereto; this experiment can be tried by any one.

A vesicular eruption has been observed on the mucous membrane in dysentery and cholera inducing some, among others M. Horner, the author of the valuable observations on the Anatomical characters of Cholera to suppose that the latter disease is a sort of inverted small-pox.

Whilst these remedies are had recourse to, the origin, &c. of the disease should be borne in mind; viz., its commencement with diarrhœa, through defective chymification; and hence it is evident that the principle of cure consists in the restoration of this process; therefore such mild diluents should be allowed as will best conduce to this purpose, viz., in furnishing materials to the viscera for the elaboration of the secretions.

Let not, I say, be forgot the epidemic origin of the disease, that it is merely the first symptom drawn out to the length it has been, and fixed by the secondary ulcerations on the mucous membrane. Witness for example ulcerations on the external surface in bad habits of body; what do we do in these cases? we improve the constitution at the same time that we endeavour to heal the ulcers. So exactly ought it to be in dysentery. The exclusive attention to the secondary symptoms has sent many to their graves: the system is kept low and impoverished, there is no chance given for the establishment of healthy action, and the putrid sanies from the ulcers is actually taken up by the system, because it is not furnished with a natural supply of materials necessary for life.

The principle I have pointed our in reference to the treatment of cholera applies equally here; and nothing more than this fact tends to point out the consanguinity of the symptoms in these diseases. In cholera the symptoms are rapid in the extreme; in dysentery they are slow and sure. In cholera there is no time for the development of evident extensive ulceration, but in protracted cases behold the completeness thereof.

This difference in the time of development must not cause a difference in the principle of treatment. The pains in the bowels and spasms or pains in the legs must be relieved on the same principle as the corresponding symptoms in cholera; and the irritating contents of the intestines must be gently assisted along the tube with a similar object in view: that is, viz. their removal from the surface of the mucous membrane which they continually keep in a state of irritation; hence while they remain there the ulcerations will never heal: and now, having attended to this, the other circumstance of equal importance must be steadily kept in view, viz. the epidemic origin of the disease. It would be tautology to repeat here what I have frequently adverted to while considering this subject under the heads cholera and fever, the very same applies here. It is now eleven years since my attention was particularly excited by the remarkable correspondence between the premonitory symptoms of these different diseases, which I have now attempted to show are members of the same family, but in different stages of development. No circumstance amongst the former coincidences was then (or is now) more prominent than the remarkable deficiency (often complete absence) of the biliary secretion in all of them. Not being able to account for this satisfactorily to myself, I instituted some experiments on dogs, in which I tied all the biliary ducts (for there were more than one) leading to the intestines. Singular to relate, none of the animals died.*

This satisfied me on this point I wished to ascertain, viz. the epidemic character and constitutional origin of the symptoms, and these altogether, coupled with the corresponding appearance and condition of the blood in all these forms to which I have adverted, left not a doubt on my mind. It was evident from this also that spasm or impervious condition of the bile tube in man (and tubes in animals) could not be the cause of cholera or dysentery, as many have supposed.

But there was, I felt, something still wanting to complete the train of reasoning, viz. artificially arresting the biliary secretion and observing the effects thereof, and this I resolved to ascertain as soon as I arrived at Nagpoor, to which I was then (1827) marching. Accordingly, some hours after having fed the animals I tied the vena porta and the hepatic artery and biliary tubes: this was in the forenoon. By the evening one of the animals had perished, exactly in the manner of a rapid and fatal case of dysentery; the stools frequent, sanious, and exceedingly offensive. Here again is therefore illustrated the nature of the constitutional symptoms. It is obvious therefore, that the condition of the secretions can only be improved through the blood, and this, therefore, is the point to which I wished to direct the attention in dysentery, as I have already done in cholera and ague, in showing, that while by the principle of treatment in question, the condition of the blood is improved, the contents of the bowels (which irritate and inflame the mucous membrane) are likewise gently carried down and expelled from the tube, and their place supplied by a bland and harmless fluid. I tried the system first upon a man *in the last stage* of dysentery, at Poonamallee, in 1827. The patient was Dr. Irvin's of whom I requested to try the laxative diluents. There was also another patient in nearly the same state (Killen,) under Dr. I. He soon died of peritonitis induced from the ulcerations extending through the coats; but the first patient (Courtney), to whom I gave laxatives, and diluents freely, lived for 10 or 12 days: he passed constantly enormous quantities of offensive bloody fluid, and the abdomen was shrunk. The very reverse was the case with Killen, January 26th, 1827. From the above, therefore, it is plain that (even in the last stages) life is prolonged by this system, and hence time is afforded for the adoption of other assisting means best, calculated to heal the ulcerations. The putrid discharges from the surfaces of the ulcers in dysentery remain in the tube, unless assisted downwards by fluids passing along, and the longer they remain, the more putrid and acrid they become, and are hence an additional source of irritation. A moiety of the fresh and bland diluent likewise enters the circulation, and if there is any hope, it cannot be said that there are not the means afforded for the re-establishment of the secretions.

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* Adhesion with a new communication was no doubt established; but I could not think of killing the animals merely to ascertain this. I wished to ascertain the immediate effect of stopping the direct flow of bile into the intestines, and this I did; and not a little surprised was I at seeing the animals survive, and one of them actually to break loose and make his nimble escape a few days after the operation.

The great and constant mortality in dysentery arises in a great measure from neglecting to observe the constitutional origin of the disease, and in a blind dogmatical adherence to excessive bleeding and mercury.

In 1826, when I arrived in India, I saw this system carried to its fullest extent; *the mortality was great; I had many opportunities* *for dissection* which I did not lose, and therefore am enabled to speak of the disposition and progress, &c. of the ulcerations of the intestines which clearly point out the nature of the disease.

I feel that I ought to have embodied and published my observation &c. at that time, that, as I have derived hints from the observations of others, so others might from mine. Since then, I have lost many cases, dissections, and remarks, and I have therefore undertaken the treatise under disadvantageous circumstances. I, however, commenced it a couple of months ago, determined to state what I had observed regarding the epidemic, for the benefit of others.

But, to return to the subject of dysentery, and the principle of treatment being similar in it, and the other forms of the epidemic, I will give an extract from a case of cholera as illustrative, and from which the reader may draw his own obvious conclusions. I knew no decided principle of treatment at the time it occurred, or I would have saved the patient; as it was, the singular fact is presented of the individual, living for seven days.

"July, 1828, Nagpoor.

Sepoy, 48th N. I. on duty at Nagpoor, was brought into hospital with severe purging of white stools, great debility and restlessness; all that he could say was that " I am dying." He continued to get worse. I remained several hours with him, and had a number of sepoys to shampoo him; he got repeated draughts of hot water with a little brandy in it. Mercurial friction was continued on the legs, till they were sore, he also got calomel and opium in pills frequently repeated; also castor oil and magnes sulph; and mercurial fumigation. He seemed to revive a little, he spoke, and his pulse, with extreme difficulty, could be perceived: the vomiting, *assisted by the warm water* seemed to give him great relief.

He continued 48 hours in a cold, lifeless state, when a little warmth returned and he could articulate; calomel and extract of colocynth were the only medicines that passed through him, but they brought no bilious stools; they brought away a thick dark bloody mucous, which I at one time mistook for black bile, neither urine nor perspiration. He complained of much appetite, and wished to go out of hospital. Some of the sepoys had given him rice, it made him worse he vomited it again, and felt relieved; he continued 6 days in this low state, and died in the evening, rather suddenly, and so quietly that no one perceived it.

SECTIO CAD:—*Very little blood in the body*;—Liver hard, a small white schirrous tumour on its sternal hypochondriac edge over the gall bladder; *little blood in the liver.* Gall bladder distended with dark green very ropy bile. No bile apparent in the hepatic tubes.

Mucous surface of the stomach, in a state of high *irritation, soft, and red*; that of the duodenum more healthy, *that of the jejunum and ileum in a state of ulceration,* exactly like other instances of ulcerated bowels, (See my dissections.) *Colon much contracted; its mucous coat very much ulcerated; caput coli exceedingly so;* appendicula vermiformis healthy, receding portions of the cells of the colon healthy, a long lumbricus at the termination of the ileum full of hundreds of young ones. Large coagula in the heart, their centres of tough white fibrin."

Here, therefore, is a case of cholera, the dissection of which cannot be distinguished from one of dysentery. How well it illustrates, what I have all along pointed out, the secondary but important affection of the mucous membrane. The reader will perceive at a single glance, that the patient was lost from the want of diluents, that there was, in fact, no system pursued in the treatment. This I could not help, I knew no system or principle of treatment at the time. I read, then, in one book, that 99 cases out of a hundred had been saved by colomel and opium, in other instances by salt; in other instances that bleeding had cured; all these again were contradicted by others; and to crown all in-the very centres of the presidencies, the cases of deaths were not less numerous than in the retired villages in the midst of the forest: *witness the very last visitation.*

I have now come forward in my turn; but I have chosen a different path; I have endeavoured to unravel the symptoms of the pestilence; not confined myself to the extolling of a particular remedy. I have not created new difficulties, but attempted to sweep away the rubbish that envelopes the disease, obstructing the clear view thereof; and what can better tend to this than giving among many other circumstances, the above case of cholera (not to be distinguished from a P. M. examination of dysentery), and pointing out to the reader the cause of death as brought about by the withholding of diluents; hence the P. M. E. reveals as stated " very little blood in the body." Is it wonderful, reader, that a person should die with very little blood in his body? or is it wonderful that that fluid, the purest and mildest of all should be efficacious in the cure?

When the tube does not contain much irritating sanies, profound repose from laudanum or muriate of morphia is attended with the happiest effects. It should be largely diluted, that it may pass not only along the tube, but be absorbed during sleep, and pass into the circulation. (See my remarks in other parts on this subject).

For the view of the action of mercury, in this and the other types, see that particular head; I may, however, here remark that the quantity to effect a purpose will entirely depend on an adherence or not to the above principles of cure, a few grains by fumigation by one method of cure will effect what drachms by the mouth would not under an opposite system. It is scarcely necessary to point out the advantage of that plan which effects the purpose with the smallest quantity of the mineral.

The physiological observations on the progress of the ulcerations along the colon, will of themselves, point out the treatment necessary for their cure. Those towards the sacral extremity of the intestines, (often the worst) are fortunately within the reach of the influence of remedies which can be applied to them; and such will be found to answer best which are most efficacious on similar ulcerations on the external surface of the body. These applications may even be made to reach the caput cœcum after succeeding attempts, and when the lower portion of the tube, has assumed the healing process, and become less irritable on the application of the remedies.

When the healthy secretions begin to be secreted, all symptoms of uneasiness or irritation quickly disappear, and the individual is himself astonished at the rapid change. This change is affected by the mutation of the epidemic constitution; or by a removal to a different locality, assisted by the influence of dietetical and other remedial measures.

When the dysenteric symptoms intermit, by the temporary but imperfect restoration of the chylifactive process, absorption of the semi-digested materials rapidly takes place, and the febrile diathesis becomes again fully developed. This is, therefore, a mixed case, that is to say, the consecutive superadded symptoms are in different and opposite parts of the system; one developed during the stage of apyrexia on the internal mucous membrane, the other at the extremities of the arterial system, and on the surface, during the pyrexial period. In the treatment of this case, the principles laid down under the head of fever are applicable, attention being at the same time had to the lurking dysenteric symptoms which will be developed during the apyrexial period.

The application of leeches to the abdomen is here imperiously demanded (even although at the time the particular symptoms have not become apparent) and they should be kept on till relief is obtained to the febrile diathesis.

The development or complete revolution of the fever will be much assisted by a liberal allowance of diluents, and if they possess the *slightest* aperient tendency, they will contribute to the gentle removal of the irritating colluvies from the primæ viæ.

The dejections should be daily tested, and, according to the reaction, alkalies or acids administered; allowances being made for the purulent discharge, which may exhibit an alkaline reaction.

When the influence of mercury is established, its action should be encouraged by improving the condition of the blood, because its action ceases if this is not attended to, imparting the belief that it has not entered the system, and giving rise to the continued exhibition of the mineral.

The passage of remedies, to heal the ulcerations, should be assisted through the small intestines by bland demulcents, and so constituted with the addition of substances, that they will not readily undergo decomposition. Opium will immediately occur to the reader, it is a substance that does not undergo decomposition under ordinary circumstances.*

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* See remarks and note under Fever.

In the Gumsoor campaign, the troops from the Nizam's territory, many of them addicted to the constant use of opium, often suffered from dysentery in its worst form. They begged and prayed to be allowed to take their opium; they took it and recovered. One severe case, in a native officer, I recollect well; I allowed him an hour or two three times in the 24 hours for his opium of which he took a large bolus each time; the remaining portion of the day he rigorously devoted to his medicine; he recovered contrary to his expectation, for he had given away his effects, and consigned himself to Allah and his prophet.

The opium will be carried down along the tube by the diluent demulcents; given alone it rests in the stomach.

The same with calomel; lime water and the alkalies speedily effect its reduction, enabling the mineral to exert its specific action on the surfaces of the ulcers. But as I have said elsewhere, fumigation with a few grains of blue pill, will induce the specific action, if this is properly assisted and encouraged; *or if it is an object* to induce the action of the mineral.

If fumigation, with a scruple of blue pill, does not induce symptoms of mercurialism, any quantity of mercury by the stomach will also fail. In this, therefore, we have a useful guide, indicating the little necessity of drenching the system with calomel.

Castor oil is a favorite remedy all over the world for the cure of dysentery, and, as in every instance, so in this important one, popular opinion is right, and the pathology of the disease at once reveals its mode of action. The surface of the bowels, studded with ulcerations, throwing out profuse discharge soon begins to feel the injurious effects of the irritating sanies. Griping pains and straining are the consequence, the ulcerations extend rapidly both in depth and breadth till the coats of the intestines are perforated, and inflammation of the bowels (peritonitis) puts an end to life within three days from its establishment. Now it is singular that popular opinion, knowing nothing of this pathology, should fix upon that very substance best calculated to prevent the extension of this fatal disease, a substance, bland, soft, and mild in its operations, gently removing and carrying off all those putrid matters from the bowels, which I have just pointed out, as that which prolongs the disease by corroding the bowels and ending in inflammation. Consequently, we daily hear of the praises of castor oil; those who have taken it for the cure of the disease attributing their recovery entirely to a daily dose thereof which gently and daily carried off the " horrid stuff" they describe, in immense quantities. This horrid stuff is the exudation or secretion, or discharge from the ulcerations, which, resting in the bowels, continually cause those painful repeated calls to stool so weakening to the system, all of which, however, is carried off by the oil, and there is a respite for many hours till the commencement of pain, and irritation is again relieved by a repetition of the dose, assisted in its operation downwards by those bland diluents most congenial to the patients condition, as well as being those the least liable to undergo speedy decomposition, g. e. whey made with the supertartrate of soda (solution), or the well known cream of tartar super tart: of potassa.

The following I had the other day from a gentlemen who had resided long in an unhealthy district in the western world. It is interesting as showing the features of general resemblance between the dysenteries of the east and west;—their association with fever; and the mode of country practice as not being more fatal than the European. The gentleman not being a medical man allowance must be made for the scanty, but interesting, information contained.

" I have been residing in some of the most unhealthy districts of British Guiana during a period of thirteen years: it is a low marshy country; dysentery is very prevalent.

First symptoms attending it are dry skin, tongue husky and discoloured, stools whitish and slimy, in a day or two they become bloody and slimy, tongue black and pulse weak.

The treatment, consists of calomel and castor oil, ipecacuanha, Dover's powder, rhubarb, injections of arrow root, &c. diet of arrow root.

In the Interior districts of British Guiana, dysentery prevails to a frightful extent, and is very fatal. European practice is not so successful as the Creole, in the former one fourth is fatal and those who recover are rarely healthy people afterwards; duration of disease from fourteen to twenty days.

The Creole practice is to give decoction of guava leaves and other astringent vegetable production; castor oil frequently, diet arrow root and plantain flour, the latter prepared by roasting the unripe plantain and then grinding it.

Next to dysentery is fever, but fever is not so fatal as dysentery except among the children, and with children fever is almost invariably followed or accompanied with bowel complaints; the mortality among children under two years is very great. 'W. B.'

SECTION VI.

MERCURY.

ITS SPECIFIC ACTION CONSIDERED IN REFERENCE TO THE TREATMENT OF THE EPIDEMIC.

I have chosen this method of considering the action of this important substance instead of that which would have led to much and unavoidable repetition, because the action of the mineral is the same throughout all the different forms of the asthenic epidemic; both bowel complaints and fever often continuing under its excessive administration or returning immediately after the system has been under its influence. In both cholera and fever, I have given it to a great extent before understanding its ratio operandi, or even indeed without having any certain object of my own in its administration, save and except those inculcated in books; I gave it with the hope as held out by these of saving life, and very often with little chance of that used to push the mineral as long as the patient could swallow it, determined to find out if it really had any influence over the disease or not, consequently, I suppose, I have given as much in one case as has ever been given by any one since the mineral was known, either in Asia or Europe; I gave in a severe case of cholera, without effect, 3 ounces 6 drams, and 2 scruples, or one thousand eight hundred and forty grains.

Now this case and many others coupled with the failure also of venesection even to the extent of five pounds of blood, or as in the case of Marshal Diebitsche (already alluded to) where no doubt there was the best advice, with all appliances and means to boot; I say all these circumstances together clearly demonstrated that there was no fixed principle of treatment of the epidemic, that mercury and venesection were empirically had recourse to, more especially in their strange combination with opium (to suppress those discharges whose sudden untimely check is inflammation, mortification, and death); that venesection was often unnecessary, and mercury almost always in the collapse; and I felt convinced that every successful case I had hitherto treated had owed its recovery more to good fortune than to the treatment, and that in every fatal case the treatment seemed to have no other effect than hasten death. I have, indeed, mentioned that hopeless cases, which have been left alone (without attempts to bungle them out of their lives) have actually, contrary to expectation recovered, what more need I say, Coupling all the circumstances connected with the unsuccessful, uncertain, nay, empirical practice in the epidemic, with the simple, successful, natural treatment of my own case, suggested solely to my mind by the urgent thirst and the desire for its relief, regardless of every other consideration, I perceive d that the dictates of theory and not of nature were followed in the treatment. Had I not had the disease myself, I should not, I believe, ever have been able to distinguish between one mode of treatment and another; but, when the individual himself is the sufferer; when the pains of intolerable thirst weigh him to the ground; when, in opposition, to all rule and injunction of nurse or physician, in the hour of death, he follows the natural dictates of his mind, seeks the cool air and open canopy of heaven, and pours in the cool and crystal stream to quench the fire of destroying thirst, I say when we experience this in our own person and live, we have a right to speak out for the benefit of others.

Ashamed am I to say, that I was unacquainted with the practice of Sydenham, and, although many had written on Cholera, all seemed more intent on giving some new fangled doctrine and theory of their own, than occupying themselves in the advantageous task of unfolding the treatment of the great master of English physicians. The consequence was that I partly continued to adhere to the old system and partly to the new because both were as yet empirical to me, and it could be said that one case recovering was no argument against an opposite system, under which also some lived but many died. The patients continued to die but more slowly than before, and, having given mercury a fair and final trial as already mentioned, I abandoned it entirely as not to be depended on in the acmé of the disease, and saved my patients afterwards by the natural system as already described.

Last season when cholera commenced its ravages and became epidemic and extended along the whole coast I had numerous applications from the labouring poor in the neighbourhood, from villagers far and near and from travellers passing by I at first tried a modified system with lime water and calomel as explained in the sequel, but perceived its injurious tendency in causing unnecessarily excessive disease of the gums, &c. some time after recovery. I accordingly afterwards directed the principle of cure solely to the alleviation of the most urgent of all symptoms the thirst. The first case I had was one of my own servants I found him lying in the varandah nearly speechless, he had been purged till he was no longer able to rise—eyes sunk and all the other signs of the low form, save urgent burning thirst he complained of nothing else and wished only for its relief; I made him an effervescing draught of a pint and a half of cold spring water he drank it without taking his lips from the vessel, he remained quiet for a while, I gave him another he fell asleep; in the morning I found him perfectly well.

Second case :—a day labourer at the house was seized with the common symptoms of the disease, occasional purging and spasm, loss of voice, &c.; the motion of his right hand brought frequently up to his mouth indicated that suffering from thirst which his tongue was unable to express. The cooling and refreshing beverage was given as often as he desired, his eyes sparkled with new life each time;—he recovered rapidly.

Case third :—the subject of the former case applied for relief for his son, (grown up) attacked with "the same symptoms as himself," and wished to know if he might give some thing to drink; he was furnished with the materials for the preparation of the draught and was desired to give one when the thirst was urgent in as much *cold* water *as the patient desired for a draught* each time,—he recovered.

Case fourth :—I may call this reference to my own case which the reader will find under section Cholera. I wish here to point out that the principle of cure cannot be defined in grains of powder or ounces of water;—in my own case I called for the effervescing draughts as often as I desired, I was solely guided by the desire to relieve the urgent thirst; and so in the above cases the principle is exhibited, the patients are simply desired to repeat the draught as desired, in this consists the whole principle of cure, nature does the rest; the fluid enters the system, the thickened blood is thinned and the circulation once more set agoing, while at the same the refreshing diluent gently carries downwards the diseased matters of the bowels.

Case fifth :—this case occurred some time previous to the period alluded to. It was not treated by me but by the subject of the case himself, an old brahmin, 78 years of age (or more.) He was coming as usual to my house to play chess, it was in the evening after sunset, he had already reached the gate when he was seized with the usual symptoms of cholera, he refused all drugs, but swallowed pure water in abundance: he recovered, and plays chess unto this day. These are a few of many other cases of an exactly similar nature, these few will suffice; perhaps they would have been better placed under another head, but the change of treatment was and is so intimately connected with the former exhibition of mercury, that it is really impossible to mention one without the other, one system rose out of the failure of another, so it is necessary to mention both, and therefore I will now proceed to unfold my views of the action of murcury as deduced from experience, in the hope of their being of service to others, in pointing out how the mineral in any shape cannot, unassisted, thin the blood and enable the circulation to be again set agoing, as well as that it cannot dilute and blunt the acrimony of the contents of the bowels.

Calomel is the usual form of administering this mineral in cholera, and the large quantities in which it has been given without producing its specific action, must be familiar to the recollections of all who have treated this disease. The case that I have already mentioned is an example, where 1840 grains were taken, but it terminated fatally, the patient died of the consecutive fever so common a termination in Russia; and it was not till after the febrile diathesis was fully developed that any symptoms of ptyalism were developed: most of the mercury passed off in grey coloured and afterwards green evacuations.

When calomel has been exhibited in cholera it is often returned by vomiting in exactly the same state as when first taken, although it may have lain for hours in the stomach.

In fatal cases also it is found lying on the mucous membrane of the stomach in exactly the same state as when swallowed.

From these it appeared to me that it might thus be given in any quantity without producing its specific action in those severe cases where it was precluded from displaying its effects by the absence of other means of cure.

The failure in obtaining the effects of mercury by the administration of calomel by the mouth, has led in severe cases to the inunction of mercurial ointment, and the effect developed has often been sudden and remarkable in the restoration to sensibility, of individuals already in a comatose state.

In cholera, however, this never takes place, as long as the collapse continues; because, the mercury is not absorbed in whatever state it is presented to the surfaces. In less several cases, where the circulation continues, and, after the cessation of extreme purging, there is a tendency to reaction, and development of the arterial diathesis, it very often happens that the effects of the mineral begin to be developed at a time when unfortunately it is least required. Having perceived in other cases of disease the influeuce of mercury speedily manifested when applied in the form of the blue ointment to the external surface, I was induced to imitate, in part, this mode of application in administering calomel,and, for this purpose, its exhibition was followed by repeated draughts of acqua calcis. The effects were beyond my expectations, for the subsequent irritation of the fauces, and ptyalism, were as distressing as the disease for which they had been exhibited. This led me to consider that the effects of the mineral were secondary, and therefore in a disease of this sudden nature, which had thus yielded to the influence of conjoined remedies, that it was rarely demanded.

In severe cases of cholera, neither mercury nor any other medicines taken into the stomach are absorbed, and therefore, neither one or the other can produce any of their specific actions.

The blood from its viscidity, is unable to pass through the pulmonary tissue; the whole absorbent system is consequently distended, and no absorption can take place, on the contrary it throws off what spare aqueous portions it has got to relieve itself as much as possible;

and hence after each fit of vomiting we perceive the skin bathed with clammy perspiration, which is an exudation, from the distended absorbent system, or from the base of the cone of returning fluids.

When reaction commences, the case is altered, the blood is in the arterial system, and the absorbent system now takes up materials to convey them onwards in the course of the circulation. It is at this period that substances are absorbed. But these require to be of such a nature that they will readily permeate the tissues.

Now, as in the inunction of mercury, the effects of this mineral are brought about by its volatilization, thereby enabling it to enter the air passages and pass, in its state of vapour, into the circulation; so, from the internal surface of the stomach and bowels, it passes in the same manner through the tissue of the mucous membrane. Hence, the reduction of the mineral by means of lime water enables it speedily to be developed in a state of vapour in the internal cavity, and from thence to pass quickly into the general circulation.

In those cases, therefore, of obstinate disease, with a languid circulation, and complete destruction of the chylifactive process, calomel may be given in any quantity without producing ptyalism.

From this the inference is irrisistible that it has no specific action in cholera, in illustration of which observe the following.

Let two individuals be selected, suffering from attacks of cholera of equal severity, with the usual symptoms of collapse, unattended with peritonitis or other inflammatory superadded symptoms:—

To one let effervescing draughts, (of carbonate of soda in excess,) be freely allowed to the full desire of the patient.

To the otherlet calomel be exhibited, followed by copious draughts of aqua calcis or alkalies, or their carbonates, as often as the patient demands.

Both of the individuals will recover, but the latter may probably be eventually destroyed by the subsequent violent salivation.

The conclusion is irrisistible from these three examples, that the diluents have been the means of restoring the fluidity of the blood, and that, therefore, calomel has been empirically administered.

Considering the subject in this view, I relinquished the exhibition of calomel and lime water, and trusted to the influence of fluids as already mentioned, and have had no cause to repent the change. It has been, indeed, often distressing to witness the sore months induced by calomel and aqua calcis, and happy have I been since explaining to myself the singular circumstances connected with the apparently anomalous characters of the disease, and which thus induced me to change the treatment, after giving the fullest trial to the mineral.

If it ever should be an object to affect the system with mercury, that method of administering it must be the best which insures its action with the smallest possible quantity, this method is fumigation; a few grains of the black oxide and metallic mercury thus introduced through the pulmonary tissue, will have more effect than drams of calomel taken into the stomach. Several years ago Dr. Christie mentioned in his work on cholera this native system of mercurializing, which was first brought forward to European notice by Dr. Gibson of the Bombay. Med. Est. "He recommends the patient to be placed on the floor and covered with thick blankets and to be fumigated with the blue pill ;(but the exposure to the smoke from the burning cow dung cannot be good) he also says a few applications of a scruple each time are sufficient." Nothing more is necessary than heating an iron spoon to redness and volatilize a few grains of blue pill on it below the bed clothes (which can be supported around the patients head) (20 grains of blue pill I have found sufficient for two obstinate cases of acute rheumatism ;) I have not had recourse to it *in cholera,* for the same reason that I do not now give mercury in cholera, because its effects can never be developed either in part or wholly where there is no fluid to enable that very secretion to flow whose increase depends on the presence of fluid in the blood). It is almost needless to recapitulate that unless diluents are freely allowed to enable the blood to perform the middle passage, fumigation with mercury will prove a failure; hence the principle of cure rests on the restoration of the circulation not on the exhibition of mercury which cannot effect this.

When calomel is found in the stomach after death, the corresponding portion of mucous membrane is often found inflamed.

The action of the mineral on the tube, induces a contraction of its muscular fibres; the canal becomes lessened, and the mucous coat assumes a pale colour, because the blood vessels, now also contracted, contain little or no blood.

Any substance, which produces the contraction of the intestines, has the same effect upon the mucous membrane; and the converse consequently is equally evident, viz. that in the distension of the tube the blood will flow into the expanded vessels.

Hence in cholera, necroscopy discovers that the most distended portions of the intestines are the most vascular, and the most diseased; the first from the reason I have mentioned, the second from an equally obvious one, viz., that the surface (exposed to the diseased action of the contents of the tube) being greatly extended, afforded every opportunity for the extension of the inflammation of irritability.

The converse of the preceding is also invariably found to be the case, viz. that, where the tube is contracted, there the mucous membrane is of a pale colour.

The wisdom of this arrangement is obvious; the blood is not only not required in this condition of the intestine, but it likewise even cannot enter the vessels.

The blood is only required when the cavity contains aliment, and the tissue of blood vessels becomes expanded, and consequently filled whenever the intestine becomes distended therewith.

It is perfectly clear, therefore, that when they are distended *in cholera*, they must suffer, because the very circumstance, in the first place, implies a collection of diseased matters, which can be productive of nothing else but disease; and secondly, the intestine being here expanded, vascular, and its coats remarkably thin, disease must be extremely rapid.

In health the same obtains: the mucous membrane of the stomach when distended with aliment is of a vermillion* colour; but when it is contracted, as after an emetic, it is of a pale hue.

Calomel, in passing along the tube, induces a similar action, causing the contraction of the muscular coat, and the consequent pale hue of the villous.

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* Beaumont, on the Digestive Powers.

It is not, however, often that it passes into the tube in cases of cholera, all diluents being withheld, which are the only substances that can enable the mineral to be conveyed downwards, by their inducing the regular peristaltic motion.

When, however, it may happen to pass downwards in the worst cases, even although partially reduced, it fails to exert any influence first from the absence of diluents, and second, from the stoppage of the circulation. A liberal allowance of alkali in copious effervescing draughts would quickly cause the reduction of the mineral, and by also setting the circulation in motion would enable the vapour to enter the system. This I have mentioned for illustration, not because I think the mineral necessary in the instance in point, for I do not.

When, in health, and when the bowels are filled with aliment of varied kinds, and supplied with no less varied secretions, mercury is exhibited, salivation is a never failing attendant; and the effects of the mineral continue till it is expelled from the system, or deposited in some of the osseous tissues, as often seen after death*.

In cholera, where all fluids are withheld, and where large quantities of calomel are given with oil, or cathartics, &c. to force it down, we find it passed off with the dejections in a semi-reduced state, the grey and black oxides imparting a more or less dark colour to the matters that have been passed.

The blood being here stagnant, the mineral has no opportunity of being conveyed into the circulation to produce the effects which we perceive take place after even the minutest quantities given in cases where it is contra, indicated.

When given in large doses in health it is soon reduced to the state of the black oxide, and the dejections partake of the same colour, often as black as those succeeding the exhibition of chalybeates; both are signs of a healthy state of the secretions and alimentary matters.

When calomel passes off by stool unchanged it is the worst sign that can occur, as pointing out the total absence of the natural secretions and other usual contents of the primæ viæ.

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* Christison on Poisons.

When *unfortunately* the mineral has been received in quantity into the blood every means must be tried to obviate its destructive propensities.

The paroxysms of its increased energy return at periodical intervals corresponding to the daily and natural return of increased arterial action. This period generally follows the course of the sun, becoming augmented at his height, and receding as he declines; till there is again a remission of the painful ptyalism during the late hours of the night.

When the ptyalism is at its height venesection should be had recourse to to an extent proportioned to the severity of the case; the diet should be of the *most nourishing kind,* without stimulants, but with a liberal allowance of diluents, and decoctions of the perspirable woods; the tepid bath should be frequently had recouse to, and the clothing and bedding often changed. The venesection should be repeated according to circumstances, and the same system of diet and regimen rigorously pursued, till the old has been replaced by fresh blood, and the metal consequently removed from the system.

From what has been already said regarding the action of calomel in cholera, it will be immediately perceived that from the consanguinity of it and dysentery, the same remarks will nearly apply to the latter disease.

If the object of scruple doses of calomel is to affect the mouth, it will be perceived from the foregoing observations that the practice is empirical, because fumigation with fifteen grains or a scruple of blue pill will affect what 10 or 20 scruple doses of calomel will not affect by the mouth; the mineral passes off nearly as in cholera by stool, and does not enter the system.

If there is inflammation of any of the viscera, and there is little time to be lost in affecting the system after the necessary topical or general depletion, the superiorty of the above expeditious method of procuring the effects of the mineral, with the smallest possible quantity, must be still more apparant.

It often happens that in dysentery an exudation is thrown out at different portions of the tube to protect itself from the altered secretions, and calomel by being reduced by these has a tendency to remove them and expose the ulcerated surface, it should therefore (the mineral), when exhibited, be given in the form of black oxide, or the calomel should be followed by lime water, or doses given of the alkalies, assisted by mucilaginous drinks; in this way it will pass gently along the tube and exert its specific action.

Under the head dysentery I have described the general principles of treatment, and pointed to the method of healing the ulcerations on the same principle as those of a similar character occurring on the external surface of the body.

Death often seems to be caused by the absorption of the pus and sanies collected about the ulcers, and resting in the gut. The method best calculated, therefore, to counteract this condition is obviously indicated as of the first importance; and hence it often happens that if we can heal the ulcers in the descending colon alone, that the patient will recover, because the remaining portion of ulceration is not sufficient to destroy life before the system recovers the shock and effectually assists itself in the healing process.

It is not the object at present to enter into the minute* particulars connected with the after treatment of the ulcerations, but only to point to the epidemic character of the disease in connection with the other types. Suffice it to say that mercury will not cure the ulcerations, when they have become fixed and extensive over the colon. These are superadded symptoms as I have already remarked under the treatment of that disease, where I directed the attention to its epidemic character and the premonitory diarrhœa.

Fever.—It is in certain types of fever that the induction of ptyalism is sometimes unavoidable, yet justifiable. In cases of the ephemeral and intermitting varieties, that have passed on into the continued or remittent form, and wherein the sensorium has become implicated more or less, and the individual in a comatose state, then mercury is often productive of the best effects.

In these cases the power of deglutition being gone the mercury is generally rubbed in in the form of the blue ointment on the thighs and arms, with the object of introducing it through the pores of the skin of the part rubbed; the cuticle of which is consequently frequently abraded by the hard friction employed.

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* See Dr. Elliotson treatment.

The mercury in these cases does not affect the system through the epidermoid tissue, but as I have mentioned, when speaking of cholera, it is received in the act of inspiration, and enters the circulation through the tissue of the lungs; passing in the same manner as the oxygen centrad or fixed air peripherad.

In proof of this, individuals, employed in the rubbing in the mercurial ointment, *and other constant attendants on the sick,* are often afflicted with a grievous ptyalism, and the shaking of every tooth in the head.

During the operation of rubbing in, the mineral is volatilized, and forms an atmosphere around the individual, affecting all within its limits, but displaying its effects in a greater degree in the immediate vicinity of its source. This mercurial atmosphere or vapour is inhaled at every inspiration, and penetrates the tissue of the lungs speedily and effectually.

Extraordinary cures have therefore been affected after this manner in individuals in a comatose state, when all chances of recovery were apparently gone. I recollect, among many, one instance in particular, illustrative of this, in the case of the wife of a non-commissioned officer of the European Regiment (in 1828 at Nagpoor,) the patient was in the comatose stage of malignant remittent, a consultation was held, and the worst anticipated. I directed the constant inunction of mercurial ointment about the *neck and chest* till a decided change was perceptible. The dried sordes, after 24 hours, fell from the lips tongue and fauces and the patient *awoke* with saliva flowing from the mouth.

It must constantly be borne in mind however that this effect is not brought about solely by the unaided influence of the mineral; because it must be recollected that hopeless cases of the worst kinds of fever have recovered without mercury having been exhibited at all; cases are daily recorded illustrative of this; and none are of a more unique and remarkable description than those which are always occuring on the banks of the holy river. Here are seen individuals in the last stages of disease brought to terminate their lives in the vicinity, or within sight of the adored stream, yet nature, the best physician restores them again to perfect health.

The powerful effects therefore resulting from a free and constant exposure to the influence of the atmosphere in these cases, must not be forgot or left out in recording the recovery of individuals by the induction of ptyalism.

The passage of azote is as constantly taking place into the system through the dermoid tissue, as oxygen through the pulmonary; and the aqueous vapour diffused throughout the atmosphere is no less influential in the restoration to the normal condition.

This principle of life is well illustrated in the instances of parasites. The chemical growth of plants too is proved by fuci which thrive without roots; and the epidendrum which grows, flourishes, and blossoms, when suspended in a room, merely by decomposing the air and vapour,

It is with such a powerful agency as the foregoing constantly at work, that success in hopeless cases attends the administration of mercury.

The absorption of aqueous vapour is insufficient often, by itself alone, to enable the circulating system to throw off those obstructions which exist, and are the cause of the symptoms.

In the repeated paroxysms of fever, the blood, thickened and depraved by the addition of unassimilated matters pervades all the tissues of the system, but more particularly effects the tenderest and most important, and which is first displayed in the absence of sensibility to external impressions), continues to circulate languidly and difficulty in the extreme capillaries of the cerebral organs and in many of these becoming a series of obstructions.

It is in these cases, with the marks of approaching death, that free exposure to air and moisture frequently affects a cure with the assistance of mercury. Aqueous vapour is absorbed, the blood is thinned, and the obstructions in the different tissues removed.

Such is the influence therefore of this fluid in the removal of disease; and we will hence be able to perceive that the exhibition of the only other perfect fluid in nature, should cæteris paribus, be accompanied with similar good results; or with results proportioned to its penetrativity. This we find exactly to happen, and that, when mercurial vapour is inhaled, it passes into the circulation, proceeds on wards with the columns of blood, and is distributed with it into ten thousand streams, imparting to these an impetus and power which distends their muscular parietes, and breaks down the obstructions that have existed in these minute capillaries.

Throughout the whole system the same *mechanical* action is displayed, and the blood is quickened in velocity in every organ and tissue. The secretions of the liver, pancreas, stomach, œsophagus, fauces and salivary glands are all increased.

But this mechanical influence thus imparting increased velocity to the blood (and consequent augmented secretions therefrom), is found to obey the same laws as the general actions of the system; for it has its periods of daily increase and decrease as influenced by the tenuity of the circulating fluid. Hence on the same principle, the reason, that in cholera, where the blood is thick and viscid, mercury, though given in any quantity, will fail in producing its specific action. This leads to the irresistible inference that before the system be impregnated with mercury that more natural fluid, which the Divinity in his bounty, has so liberally bestowed, should be freely, fully and repeatedly tried both in the form of vapour, and the more substantial one of refreshing diluents, to which I have already adverted. For when these last have been fully tried the circulation is in a condition to benefit by the smallest quantity of mercury that can impart the specific action of that fluid. Whereas the chance of relief, without the misery of salivation, is in the other instance entirely lost; and the benefit resulting in the second case completely thrown away.

To conclude these remarks the tenor of which must be sufficiently obvious I will only here observe that nothing is so simple as the application of the mercurial vapour, and to this I have already referred.

Aqueous vapour applied subsequently, with the same easy facility in these grave forms of disease will determine effectually the transit of the mercury with increased rapidity along the course of the circulation.

When the system is saturated witn mercury, ague will still return; in the collapse the mouth is dried up, ptyalism returns as the fever is developed towards resolution.

Cholera attacks while the individual is under the influence of mercury; ptyalism disappears; a liberal allowance of diluents cures the disease, after which the ptyalism returns.

In dysentery calomel may be given in large quantities without inducing ptyalism as long as nourishing diluents, and alkaline remedies are withheld.

By these facts the intimate nature of the epidemic is revealed, and the abuse of mercury displayed.

The nearer the preparation of mercury approaches the metallic state, the sooner does it produce its specific effects on the system. Hence the well authenticated instance of nearly a whole ships crew being salivated, and reduced to the most deplorable state of disease from the vapour of mercury; originating in the upsetting or breaking of the flasks.

And the converse is no less true that the more removed from the metallic state the longer it takes to produce its specific action; indeed generally never, at least in doses in which it can be given with impunity.

Corrosive sublimate may frequently be given in any quantity without inducing ptyalism. It will occasion pains of the jaws and throat, œsophagus and stomach, with bloody sputa, pain at the scorbiculus cordis, and difficulty in extending the chest, but seldom ptyalism. If it is decomposed in the stomach when taken, it is probably recomposed as it passes the chylifying organ or that viscus which preserves the alkaline diathesis of the system.

The chlorine of the mineral acts upon the albumen as the chlorine and hydrochloric acid in the stomach, on the same substance in health; yet in the lacteals we find the albumen in a dissolved state, which it was not in the stomach; and we know that between these two points it has been subjected to the agency of the alkaline principle which has the effect of dissolving albumen as it passes from the stomach in whatever state of ordinary combination. The oxide is therefore probably dissolved at the same time as the albumen in its new state of combination with the alkali which, in health is always in excess. Hence in diarrhœa with deficiency of the alkaline diathesis the stools have a curdled appearance, marking a dificiency of solvent power in the biliary secretion, and which would in this case therefore allow of the passage downwards of the altered albumen; while, in the other case the whole would be dissolved, rendered transparent, and absorbed, no trace of metallic mercury or the black oxide appearing. In this way may be explained the reason why this preparation does not in general induce the specific effects of the mineral, which as I have already said must for that purpose be reduced.

This is not only plain from every day observation, but from the obvious circumstance that calomel (the preparation generally exhibited for effecting salivation) not being diffusible, or existing in a state of vapour or fluid at ordinary temperature cannot enter the system unless it is first reduced. Hence in diarrhœa, dysentery and cholera ptyalism does not take place, because most of the calomel passes off as taken or else lies in the stomach; (and in some cases actually said partly to be converted into the bi-chloride). But if are exhibited, lime water or the alkalies, then ptyalism rapidly takes place, and with much violence, in proportion to the quantity of the mineral that has pervaded the tissues.

Should the disease be inflammatory, obstructions will be removed by the impetus given to the general (circulation in contradistinction to a part affected,) a general excitement is established which is now the the object of remedies to relieve as I before stated.

Should the disease however be of an opposite character, and especially, attended with organic lesions of an important organ, then the increased impetus added to the momentum of the circulation, will tend to carry on the work of destruction with redoubled and fatal intensity.

In indolent ulcers on the surfaces, whose vessels have become obstructed, the general excitement of the circulation makes them put on a healthy action; the appearance of the ulcer is the guide for the continuance of mercury, not ptyalism, which is to be avoided. The difference in the pulse will also indicate the quantity that has been received into the circulation.

All the salts of mercury act as irritants to the surface; and when received into the stomach the effect is communicated through the expansions of the pneumo-gastric nerve, and gives rise to that nausea and languor the first symptoms. The stomach contracts upon the irritant, the blood is expelled from its internal blood vessels, and its mucous surface becomes pale. If the salt is calomel, lime water or the alkalies remove this. If corrosive sublimate albumen. If the most violent of all the nitric oxide, hydro-sulphurets.

It will be observed therefore that while these are topical irritants they are general sedatives, and that while the metal is a general irritant, it is a topical sedative. Observe tartar emetic, its irritation on the mucous membrane conveyed through the expansions of the pneumo-gastric, produces sedative effects in inflammations often surpassing venesection; the stomach and tube contract upon it, and the mucous membrane is consequently pale. Let the tube be tied at the ilium; from thence to the stomach it will be found distended, and the vessels of the tunics gorged with blood ; and where ever the calomel, corrosive sublimate, nitric oxide, yellow subsulphate, (or tatar emetic to illustrate the principle) are found, there will be also found irritation running more or less into inflammation.

I have adduced these supposed examples for the purpose of illustrating the primary action of the salts. They are of no use in urgent cases of disease where it is an object to salivate: this can always be insured in twenty-four hours from fumigation with a few grains of blue pill.'

As external applications however they are super-eminent, and the hyd. ox. nit. surpasses them all, their effect seems to be in proportion to the pain they occasion at first, and the last mentioned produces most. The wound or ulcer is excited to throw out healthy secretions and the salt is decomposed, by the hydro-sulphurets of iron and copper, for it is deposited on the wound in the form of a black powder. Thus we perceive these salts are reduced both on the external and internal surfaces, without which the specific effect of the metal never takes place. Hence the obvious inference that fumigation is the natural method ; occupying the least delay, giving the least trouble or annoyance, requiring the smallest quantity, and productive of the least secondary constitutional injury.

In perfect health a few grains of calomel often induce salivation, this rapid effect depends on the same principle ; the salt is speedily reduced partly to the metallic condition by the free alkalies and their carbonates, or lime or the hydro-sulphurets, or sulpluretted hydrogen; it is divided and mixed with the contents of the bowels, and extended over their surface throughout their whole extent and being productive of no irritation or counteraction on the mucous surface its vapour speedily permeates the tissues, and entering the column of blood gives it that increased impetus the result of its well known qualities.

From this known effect in health a useful lesson is derived in reference to its exhibition in ague, that universal malady, in which the principle of akalinity is deficient, showing the probability (and fact) in many cases, that the proto-chloride is converted partly into the dento-chloride, the very substance of all others the most pernicous in this disease as tending to the crassitude of the serum, which is the chief aim and object in these diseases to prevent. The effect on the albumen is seen in the instance of the bi-chloride rendering it turbid, and the influence of the volatile alkali is seen on adding a few drops, when this turbidity disappears, and a clear transparent solution reformed, which would now have the property of permeating the tissues, illustrating the disposition of the alkaline diathesis; hence in acute idiopathic inflammations the tenuity of the serum, the result of this alkaline diathesis, which does not interfere with the contraction of the fibrine. But in cholera the serum entangles the fibrine; here the alkaline diathesis is absent, and the consequence is visible.

In the abundance of the alkalies therefore consists in a great measure the tenuity of the blood, and its power of dissolving those substances destined for its daily supply. In the epidemic under consideration it is unable to do this.

I may conclude these remarks on mercury by pointing to its exhibition in diseases of the liver; a method so commonly had recourse to; and here it is equally obvious that its reduction to the metallic state is necessary to its action on that organ, since calomel, if not reduced, is passed off by stool.

Therefore the exhibition of calomel in pills resting in the stomach must be attended with scarcely any appreciable effects in comparison with those resulting from the exhibition of the black oxide made to traverse the whole tube by the assistance of alkaline diluents. The vapour of the metal is in this last instance in immediate contact with the whole expansions of the radicles of the hepatic tree (the portal circle), it speedily permeates the tissues, enters the column of portal blood, and passes direct through the circulation of the liver, removing obstructions that there exist; the diluents given along with it assist this action, for I have already frequently observed that mercury may be given in any quantity without effect if the blood is thick; and also I pointed out that the paroxysm of fever will return while the system is under the influence of the mineral, because it cannot prevent the crassitude of the blood, the forerunner of the collapse.

Hence a few grains of the black oxide made to travel along over the expansions of the radicles of the hepatic tree, will have more effect than a dram or indeed any quantity of calomel resting in the stomach.

SECTION VII.

CONTAGION,

IN REFERENCE TO CHOLERA AND ITS CONGENERS, PHYSIOLOGICALLY CONSIDERED.

Much has been written upon the non-contagious nature of cholera, whilst appearances, have, in innumerable instances, tended to induce a contrary belief, especially among the great body of the people. The reason of the apparent discrepancy in the history of the contagiousness of cholera has resulted from the partial view that has been taken of the disease, and noting down the more tangible and apparently more fatal symptoms to the exclusion of the rest.

The stages in cholera are the same as those in quotidian fever. Those of quotidian the same as those of tertian, this again of quartan, and that again of continued fever; the difference is only to be found in the length or shortness of their respective stages; but each of them run into each other, intermix with each other, and alternate in interminable succession; yet the determining and ruling principle is clearly distinguishable in all.

Now, ague, in the collapse stage, is not contagious, but if the fit should return under adverse circumstances, the system will not be able to shake off the febrile diathesis, and the hot stage continues constituting the continued type of fever;—this fever, under certain circumstances of climate, diet, and treatment, will become contagious; and hence is presented the anomaly of contagious ague.

So in cholera the same circumstances contribute to render it contagious, and hence in Russia, where the peasantry, in many instances, laboured through the cold stage they reached the hot, which unfortunately proved as fatal, not only to themselves, but to others to whom they communicated the disease.

In the report (of Drs. Russell and Barry) on the Russia cholera, it is stated—“ This singular malady is only cognisable with certainty during its blue or cold period. After reaction has been established it cannot be distinguished from an ordinary continued fever, except by the shortness and fatality of its course. The greenish or dark, and highly bilious discharges produced in the hot stage, by calomel, are not sufficiently diagnostic, and it is curious that the persons employed about these typhoid cases, when they are attacked, are never seized with ordinary fever, but with a genuine cold blue cholera; nothing, therefore, is more certain, than that persons may come to the coast of England, apparently labouring under common febrile indisposition, who really and truly are suffering from cholera in its second stage."

There can be no doubt, therefore, upon this head, nor need there ever have been any, had it not been considered apart and different and independent of other diseased action.

We only see in this Russian cholera, when compared with that in other countries,—cases of the disease under various forms and garbs, like as we see over India on a lesser scale, or on a still more contracted scale in hospital practice. Here we will see the weakly and cachectic sinking rapidly beneath the influence of the scourge, while the stout and robust, and the rude in health, labour violently under the spasmodic form of the disease.

And so in Europe, the disease presented various forms of severity, according to the habits and stamina of the individuals. On the banks of the Seine, they sunk rapidly before the disease but, in England and Russia, the body was not so easily overpowered.

I believe the popular opinion is, that cholera is contagious, at least intelligent landed proprietors, those who have an interest in the labouring poor, consider it contagious; they have more opportunities of judging than others, and see many more cases.

It generally happens, that individuals labouring under the first and cold stage are brought for assistance and treatment, these generally die; but those who have passed this, and entered the stage of excitement, are never heard of, or if they are, it is as fever, or dysentery, or diarrhœa; whilst all the while, from the moment of entering the hot stage, they have been additional sources of the scourge; so much so indeed, that one case of typhoid termination, would generate as much febrile miasm, as several hundred dying in the cold stage.

The reader will perceive that, in one case, the laboratory of nature is not at work; that there is no circulation or motion of the fluids; that there is a deadly coldness and stillness of the system, and that whatever fluid is passed is speedily absorbed by the ground, or removed by the attendants.

But in the typhoid consecutive fever behold the difference; the blood is now in motion in the arterial system, the tissues rapidly undergo decomposition, and the vapour from the skin and the lungs form a febrific atmosphere around the individual, affecting those within its reach, with the same fever, commencing, too, with the same severe cold stage, in which they may perish, or from which they may escape only to linger out the febrile term, like the individual from whom they caught the infection.

And so it has exactly happened as we should expect, viz. that where the reaction was frequent, and the typhoid symptoms frequent, there the attendants, including medical men, were very often attacked.

In the report of Drs. Russell and Barry, to which I have already alluded, it is thus stated—" Twenty five medical men have been already seized, and nine have died out of two hundred and sixty-four. Four others have died at Cronstad, out of a very small number residing in that fortress, at the time the disease broke out there. Six attendants have been taken ill at a small temporary hospital behind the Aboucoff since we last wrote. Hospital attendants were most liable to relapses; one physician had three attacks.

All the discrepancies, therefore, which appear on the side of the non-contagionists and their opponents are accounted for; and the real state of the case is thus shown to depend upon the stage of the disease in which death or recovery takes place.

Nor indeed has the stage of reaction confined itself to the development of simple fever, but would appear to have attempted to establish the full pestilential diathesis, as if some small additional were only wanting to complete the development of a true pestilential fever.

It is singular this, for we have plague and cholera raging in India, at least the former was, and probably will appear again; while cholera has been raging with extreme violence on the eastern coast, and is now steadily progressing to the north-west to meet its antagonist.

If the cholera should prove mild, I mean should the stage of reaction be the prevailing termination, then will the development of the pestilential fever be a very constant concomitant: but if the effects of the fibrific poison be excessive, then the cold stage will be the prevailing form.

In the Russian report it is stated—"The third termination of cholera was a bilious or bilo-nervous fever, with suppuration of the parotid glands; in one case with axillary suppurating bubo."

The more prevalent the fever in a place there will the cholera prevail in a proportionate degree; and an individual, leaving that particular place, will carry the seeds of fever with him whereever he is going, and afterwards have either an attack of cholera or of fever, according to the circumstances of time and place.

I have frequently seen cases of simple fever in individuals who had travelled upwards of 250 miles from the jungle where they contracted the seeds of disease; a period of from 6 to 10 days had elapsed. Had the reigning epidemic been cholora at the period of their arrival, their disease would have developed the prevailing type, as it was they were with difficulty saved from the typhoid collapse.

In England the period of exemption from cholera was reckoned about the same time. Dr. Hutchinson states, the longest period of incubation of the virus is in cholera six days.

In 18 vessels arriving in England from the Baltic, the greatest number of attacks took place before the fourth day, and only one attack so late as the 6th day after sailing.

The Genoes medical commission state, that those who have absorbed the germs of the disease are generally attacked before the third and always before the fourth day. Lubeck reduced its quarantine (for cholera) from 40 to 10 days.

In Russia persons are only detained 5 days.

In Genoa persons are suspected carring germs 10 days in health, 80 days in diarrhœa and 20 days in convalescence.

Clothes and bedding were exposed 3 days as the minimum, and 15 days as the maximum.

In the febrile form of the epidemic or fever.

Dr. Johnstone extends the term from the 1st to the 30th day.

Dr. Jackson to two months.

Dr. Hunter to three weeks.

Dr. Lind has seen it fully developed in one day, and he has seen it lie dormant ten.

Dr. Bancroft thinks it may lie dormant for many months, as in those returned from Walcheren. But in many instances, especially fever, this period has been far exceeded.

It was proved in America that, during the prevalence of yellow fever, the blood of individuals generally became of a yellow hue even although they were not attacked with the fever; thus showing that the change of the fluids is in many cases so gradual as to escape detection.* The above was tested by experiment: new comers were bled on their arrival, and the blood was found of natural colour; they were then again bled after a certain time, and tne blood was found changed in colour as above mentioned.

Where the fever is endemic there cholera will exhibit the first stage in a marked degree, its supervention denotes a more concentrated state of the fibrific constitution, which acting upon subjects existing in an atmosphere already febrile, makes an easy victory, destroying all attempts at reaction, or disposition to the febrile stage.

Hence those cases of cholera are the worst where there is a longing for the cold air, and a desire to be removed to an open space; and, on the other hand, the converse is no less true, viz. the slightest sensation of chilliness being the harbinger of hope.

Of this I am myself personally aware, having experienced it during a late attack of cholera, which was severe enough to require two or three people to keep my legs from being twisted in all manner of ways.

This is the febrile movement towards the surface of the lungs and skin which, before colder, are now becoming warmer than the atmosphere, and hence it is now felt to be cold, and the individual begins to shiver.†

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* Tweeday and Smith on fever.

† Tweedy and Smith on fever.

From the foregoing will be perceived the reason of certain stations being proverbially unhealthy during the prevalence of cholera, so much so as that passing through them is certain to insure an attack of the disease; at the same time that the power of communicating it will be acquired.

The troops and followers that left the unhealthy juugles of Goomsoor, long possessed the unhealthy disposition they had acquired, and those who encountered them on the line of march, fell victims not to fever (observe), but to cholera.[†]

After a march of 800 miles it still adhered to those who arrived in the vicinity of Madras; from thence it spread along the great roads westward through Arcot; southwand through Salem, to Trichinapoly; and the numerous melancholy instances that occured must be

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[*] No cases of cholera had occurred at Madras or in its neighbourhood until the arrival of the body of troops from the northward; nor were there any deaths from this disease on the northern road, till after the march of this body southward. Individuals who were travelling northward and encountered this party of troops fell victims to cholera; several European, officers thus perished; among these Colonel Conway, Adjutant General of the army, who was on his way to assume command of the Hyderabad subsidiary force. He inspected the 8th Regt. of Infantry as he passed it on the line of march, next day or day after, he was attacked with cholera, and died.

His case, as related in the newspapers, bore a considerable resemblance to that of Marshal D's. which I have recorded under the head cholera; the reader, by consulting this last, will understand the subject in relation to the former instance. The exact period of the incubation of the epidemic virus varies in every case, hence, a number of individuals who have imbibed it at the same time, will not all be attacked at precisely the same period; this will vary from one to several days. In some the collapse stage will be severe, in others it will be slight, but the febrile will be in excess. In some the attack will be sudden, in others it will be gradual so as not to create suspicion, especially in the minds of those who are not or have not hitherto been aware of the consanguinity of cholera and fever.

Consequently we daily hear of cases wherein it is stated that the individuals had felt unwell during a period of the same or previous day, but that thinking nothing of it they had eat and drank as usual, and were attacked subsequently at periods which I have shown, in the instance given, correspond with those of the revolution of the natural diurnal fever.

fresh in the recollection of every one. The villages from Goomsoor southward, became affected and suffered extremely; in some of them 60 and 70 dying daily. A dense multitude of pilgrims had assembled from far and near, to celebrate a 12 years festival on the banks of the Godavery near Rajamundry; the pestilence acquired new strength and additional victims, and was soon ramified in a thousand directions; and many (I know), who repaired thither, never returned; while others, more fortunate, brought back reports which were no doubt exaggerated.

It will therefore be perceived by those who are acquainted with the nature of this pestilence, and the various grades of severity in which it occurs, that under certain circumstances, its propagation may be accelerated by the additional agency of human effluvia.

We cannot disbelieve the evidence of our senses, or doubt the veracity of faithful narrations, such as Drs. Barry and Russell on the Russian cholera, who inform us that the attendants on the lingering typhoid cases imbibed the seeds of the disease.

Nor do I see the utility or object of denying in toto the possibility of any disease being able to propagate itself under certain circumstances. As well might we deny the possession of life to torpid animals, or to reptiles dug out of the solid rock, where they must have lain for centuries; or to animalculæ which, when dried, become to all appearances, dead, and will continue to remain so for years and years, yet start into vigorous animation the moment they are moistened with water.

So in cholera, in one form the disease dies with the body; in the other it becomes a fresh focus of putrescent ferment.

Thus it would appear that they who so eagerly deny the contagion of cholera under any circumstances, and who attribute its origin and progress solely to excessive rain and heat, and noxious effluvia from dead animal matter, forget that the effluvium from these typhoid cases is the most concentrated that dead animal matter can develope, and hence their reasoning is a reductio ad absurdum; unless they can show that the prime equivalents of the two noxious bodies are different, then all argument is useless, whilst the facts are before us, supported by the testimony of respectable narrators.

In speaking of the atmosphere and its effects on life, I have used the term constitution, because I could not find an improved nor a better authority than Sydenham, its inventor, with whom, few indeed there are, who have since appeared, that can bear a comparison.

In taking such an author as Sydenham for a guide I therefore cannot go wrong :—and it is much to be regretted that his writings and those of other old authors have been so much neglected How much toil, trouble, anxiety, and despair would it not have saved had his writings been better known, and studied previous to the visitation of cholera. Thousands of remedies were conseqnently tried upon theory and vague hypothesis, when, at the last, after all the mortality, and when the disease was leaving the British Islands, the remedy which was found to be the most successful, was actually the most simple, yet universally diffused, and the very one that was recommended by Sydenham, in 1669. The author* of the treatment in question, does not seem to have been aware of the practice of Sydenham.

But to return ; the same means that are found efficacious in preventing the propagation of fever and its becoming general among a population, were found when regorously put in force, to be equally efficacious in cholera,(another of the many proofs of its consanguinity and of its being only the collapse stage in an excessive degree). Among many instances may be mentioned the singular one of the complete exemption of Cheltenham from the disease, while it was raging around. Stragglers, vagrants, and beggars of all descriptions were prevented from nestling in filthy hovels ; other precautionary measures were also adopted, and which would have been equally efficacious (as it appears to have been) had the reigning epidemic prevailed in the typhoid form.

Dr. Thomas gives the following account of the measures adopted at that place :—" Inspectors, who were members of the Board, minutely examined every quarter of the town, and even every individual house, where filth and nuisance were likely to exist, and, as far as was practicable, the Board had them removed. In many of the crowded streets, the Board discovered numerous nuisances connected with want of proper ventilation; yards, common to several houses; pools of stagnant and filthy water, which had no outlet, privies and pigstyes of the most filthy description, which, of themselves, from the exhalations constantly arising from them, contaminated the air, and became a fertile source of fever and other contagious diseases. These, in many instances, have been removed entirely, and in all, greatly abated. In fulfilling this duty, all stagnant water was removed, and the places were purified by lime, and, whereever the nature of the ground admitted of it, drains and water courses were made, to prevent a recurrence of similar mischief in future; more than 700 houses have been purified inside and out, and lime-washed in the most effectual manner, all accumulations of dung, dust, filth, rubbish, or other impurities have been removed. It may be of importance here to mention that, in a populous neighbourhood, and where one of the largest culverts, and most wanted, was constructed, the typhus fever had for a long time been fatally prevalent. This disease, however, has since entirely subsided in that district, furnishing an instructive example of the great importance of an efficient drainage to the public health.*

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* See Lancet for Dr. Shutes treatment.

The foregoing is important whether we regard it in reference to typhus or cholera, whether to the stage of reaction as determining the character of the reigning epidemic, or to the low form of the disease assuming the features of cholera.

If in a pestilential disease these means contributed to allay the severity of the disease, so in the typhoid fever of cholera we cannot deny to them a similar efficacy.

To what are we to attribute the mildness of cholera in England, if not in part to the precautionary measures universally adopted throughout the kingdom.

The extract that I have made from the report of the Holy Synod of Russia shows, that the Russians attain to as great age as the English, hence debility of constitution will not solve the question; and it is natural to conclude that the measures attended with such efficacious results at Cheltenham, were on a large scale throughout the kingdom followed by corresponding happy consequences.

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* Lancet, vol. 1st, 1832-3.

Ague, to a casual observer, would present a non-contagious character; but the contrary is an indisputed fact, not only with the agues at certain times in England, but with those in this country.

Dr. Good says—It is sufficiently disproved by the intermittent described by Sir George Baker, as existing in the more elevated situations of Lincolnshire, while the adjoining fens were quite free from it. And in like manner, the severe and intractable intermittents of whatever form or modification that exercise their fearful sway from Cape Comorin to the banks of the Cavary, and from the ghauts to the coast of Coromandel, not unfrequently pass into a contagious type, and propagate themselves by contagion. We have as much reason to suppose a febrile miasm in intermittents as in typhus.

That intermittent fevers, says Dr. Fordyce, produce this matter, or in other words, are infectious, the author (meaning himself) knows from his own observations, as well as from that of others.

Regarding this same fever that swept away 106,789 individuals, Drs. Ainslie, Smith, and Christie state, "That it spread its poisonous breath from north to south in the direction of the monsoon. Here therefore, we have ague, not only spreading in the direction of the wind, but likewise in the teeth of the most powerful monsoon."

To draw the comparison closer, I may adduce the following remark of these gentlemen regarding this intermittent: "*Alarming bowel complaints, sometimes supervene, and they too often prove fatal.*"

This alarming bowel complaint was cholera resuming its ascendency; in other words, the fever turned in upon the bowels, as Sydenham says of dysentery.

In the same district where this fever carried off 106,789 inhabitants, these "*alarming bowel complaints*" now hold indisputed sway. I accompanied, in medical charge, a native regiment, with its usual train of camp followers through the Coimbatore district; the epidemic constitution was reigning, and men, women, and children, were attacked with cholera in all its forms and varieties.

The few foregoing remarks on the subject of contagion will be sufficient to point out the method in which the subject ought to be viewed as obviating the liability of falling into error, which I have shown has been the case from forming a hasty judgment upon viewing one form of the epidemic and not another.

There are various degrees of severity of the scourge from simple diarrhœa down to collapse, and up again to malignant typhus ; hence how erroneous must be those sweeping and general conclusions deduced from observing only one variety : and not only one variety, but omitting to observe the fact that the property of communicating the disease may be acquired and again lost, by the occurrence of relapse into the stage of collapse, which constantly and often happens during the prevalence of the epidemic constitution.

Instances indeed are daily occurring, presenting the fact that cholera, under certain circumstances, assumes a contagious aspect.

The following extract from a communication from the force of the resident now * encamped before Bhopaul is illustrative of this. " But, in the mean time sickness and death are creeping among us fast. We arrived here with three officers, two sergeants, and 80 men on the sick list, and although this was to be expected in a Malwa climate in the middle of October, with the thermometer ranging from 57 at sun-rise to 92 at moon,still as the season advances, and the extremes of temperature approximate our sickness decreases, and now we have forty on the list. Two cases of cholera occurred a few days ago, but did not extend beyond that till the 72nd united their camp to ours, when twelve cases occurred within 24 hours, several of which have proved fatal. Yesterday twelve men died, and to-day seven more were carried off by that fatal disease. Since then cases have been more frequent, and has forced both corps to move their camps to a considerable distance from each other. The next report states, that 26 fighting men and sixty camp followers had perished."

And this cholera seems to have spread from Coromandel to Bhopal, the first cases occurred at Goomsoor, it then broke out amongst the various and numerous bodies of troops and followers after the campaign in that Zemindary. It spread northward and southward along

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* October, 1837.

the Coromandel coast, and broke out in Calcutta and Madras about the same time.

The troops from Goomsoor arrived at Madras in May with cholera, in June the disease had extended to Wallajabad, Vellore, Chittore, and Arcot; in July and August to Salem, Trichinapoly and Madura; and, on the 17th of the latter month, was in Colombo. Along the main road to Hyderabad a body of troops proceeded from the same unhealthy district, in July the disease raged in that city to a fearful extent so as to destroy even elephants.

Jaulna, Ellichpoor, Kamptee, and Nagpoor it reached in August.

From Calcutta it reached Lucknow, Cawnpore, Furruckabad, Jubbulpore, &c. in a couple of months.

It now seems to be raging at Bhopal, and from the foregoing extract it would appear to have been deemed expedient to separate the two camps (in which it was raging) a considerable distance from each other.

The epidemic which radiated from Madras still continues to prevail in the surrounding country; at Arcot, Chittoor, and Trippatee, it has displayed particular virulence, especially at the latter place destroying many of the pilgrims assembled in the vicinity of the holy temple. Under such circumstances, all the forms of the epidemic prevail and strive to excel each other. Cholera gives place, (that is runs on) to its febrile stage; and febrile contagion again produces cholera, as I have observed repeatedly. Besides these, it must be constantly borne in mind that the febrific constitution, and the influence exerted in particular localities, are themselves actively at work under such circumstances; and he, therefore, who rejects either will fail in accounting for the origin and progress of the pestilence.

While it evidently derives its origin from general and local causes, connected with climate and locality, still its progress and propagation will often depend on human intercourse. The mass of the people slowly brought under the influence of the fibrific constitution, as slowly have their constitutions inoculated with the epidemic virus; many suffer from the various forms of the malady, but the gradual accession of the disease is equally attended with the as gradual display of its effects, that is, the deaths do not occur in that sudden and fearful number which often happens and attracts the notice of the world; but the slow and steady tread of the destroyer tells wofully after the lapse of an extended term. The deaths are about equal in both instances, in the one case, however, they attract more attention than in the other, by reason of their suddenness and rapidity. It should therefore never be forgot that a body of men that have slowly imbibed the epidemic influence, by having been gradually exposed thereto in the first instance, and in the second to the influence of the febrific virus in their common and daily intercourse with one another, will communicate, in an eminent degree, this concentrated influence to a new body of men received among them, and who will speedily fall victims to the disease; many will perish, and the remaining body gradually partaking of the epidemic ferment, the whole mass becomes leavened, and in its turn, acquires the property of communicating the disease: hence as I have mentioned repeatedly, fresh bodies of men coming among these last, or meeting them on a line of march, will fall victims to the influence of the epidemic constitution; and in this way is the disease kept up, while the epidemic constitution and local influence continue favourable to the development of the same. Where larger bodies of men have been collected together, this is particularly remarkable, and an instance has occurred within these few days strongly illustrative of the fact, where the 27th Regt., in passing through the holy vicinity of Trippety, experienced the disease in its concentrated form, 82 individuals being cut off in one day. This was only 2 months ago.

From the following extracts will be perceived the tenor of the above remarks, as to the length of time that the disease has continued in the places where it has been firmly established; and the fact of large bodies of men falling victims to the epidemic when passing through the particular localities.

In other parts of the essay I have adverted to the importance of avoiding those localities obnoxious to ague, as the only sure and certain method of escaping the concentrated influence of the epidemic constitution; because, in such situations, where there is a large concourse of people collected together, human intercourse lends its aid to the propagation of the pestilence, and hence death alone awaits those who pass through the locality.

" Cholera still continues to rage at Arnee, and in the surrounding country, destroying numbers of the inhabitants. In Her Majesty's 63rd Regiment it has also broken out and committing ravages among all classes." January 1838. " In the march of the 27th N. I. rom Trichinopoly towards Samulcottah (last month), January, 1838,.Cholera broke out on the arrival of the Regt. at Chittoor, and attained its acmè at Trippety, the famous resort of pilgrims and religious devotees ; the report thus states, dated *Spectator*, February 3rd. 1838. Madras.

The disease commenced at Chittoor, *and with every subsequent march it increased in violence as well as in the number of its victims. In the neighbourhood of Trippety (where, be it remembered, thousands of pilgrims were carried off some few months since), it seemed as if the very demon, the father of this dreadful scourge had taken up his abode ; for, in passing this place, it assumed a most frightful appearance, as not less then eighty-two human beings* were swept into eternity in one day. Up to this day (30th January, 1838),the total number of deaths in the Regt. amount to 40 sepoys and 215 followers.

I have already alluded to the typhoid fever of cholera as occurring in Russia more particularly,.and adverted to the probability of individuals labouring under that fever arriving in England.

One unfortunate circumstance bearing strongly on the same point has lately been recorded as occurring on board the Emigrant Ship Lady McNaughten, which has lately arrived at Sydney. Upwards of four hundred emigrants were shipped on board that vessel from England for Sydney; during that passage, 57 of that number including the surgeon fell victims to a *disease said to be typhus*; upwards of 90 were on the sick list on the arrival of the vessel. Had that vessel arrived at Madras in June, (when the epidemic constitution was reigning) and brought the contagion on shore, those who contracted it would have presented the type of epidemic cholera.

This outbreak of the cholera was, as in 1817, preceded by the extreme prevalence of fever, more fatal than the cholera itself, because continuing for a longer time.

Particularly, in the Goomsoor compaign, was this especially the case, one corps in the short space of a few months, lost nearly one hundred and fifty men, and was obliged to leave the field. When I joined the Goomsoor field force I had an opportunity of seeing the deplorable state of sickness this corps alluded to was in, there were still upwards of 300 sick; and these were daily on the increase, while added to these were the camp followers and families suffering equally from disease;—all prejudice and caste were here subdued, husband and wife and child were stretched helpless on the ground.

Such existing in one corps, a conception of the intensity of the febrile constitution then reigning may be imagined. Such was the feature that disease presented on the Coromandel coast; nor was it here alone; but on the eastern coast, from Arracan to the settlement of Singapore, the febrile constitution reigned. In the latter place the disease extended itself to cattle, 500 of which were destroyed.

In a short essay like the present, it would be impossible to enter into every minute particular connected with the unhealthiness of different stations or districts: such has been done repeatedly before, in numerous instances, and therefore these may be referred to for more particular information.

My object is to point out the existence of the febrile constitution as preceding the epidemic visitation, and tending to its wide dissemination.

From not considering these in conjunction has arisen the strange opinions regarding cholera; strange and marvellous, without form and void.

It is now eleven years since I first had an opportunity of seeing cholera, and I then denominated it congestive fever; these eleven years have at last verified the arrangement I have already adverted to, when drawing the attention to the following remark from the Russian Report of Drs. Russell and Barry. "After reaction has been established, it cannot be distinguished from an ordinary continued fever, and it is curious that the persons employed about these typhoid cases, when they are attacked, are never seized with ordinary fever, but with a genuine cold blue cholera."

Non-contagionists, although losing sight of all adventitious and contingent circumstances, hold nearly the same language as I have myself used. They inform us, that Hippocrates, Virgil, Seneca, Tacitus, and the early Asiatic writers, who have transmitted to posterity accounts of epidemics which have depopulated different countries, have all remarked that they were preceded by excessive rains and intense heat, and that these seasons were generally prognosticated by the appearance of a comet. A few examples of the pestilences produced by the noxious miasma arising from the putrefaction of myriads of insects, and cold blooded animals, which enjoy an ephemeral existence during seasons of rain, succeeded by heat, and of the deleterious gases extricated from extensive alluvial deposits of vegeto-animal matter (caused by inundations of the ocean, and the overflowing of rivers) may be adduced.

Ancient Rome was subject to severe periodical epidemics, originating in the overflowing of the Tiber; and in the year of the Christian era, the mortality was so great as to destroy 10,000 citizens daily. A comet, accompanied by excessive rain and heat all over the world, marked the year 1347 A. D. and hence arose one of the most dreadful mortalities that we have any record of; it was named the Black Death and is said to have carried off two thirds of the human race in a very brief period; many places were entirely depopulated; in the east where it commenced twenty millions of people died in one year; 100,000 perished in Venice, in Novogorod, and in Pskow, (where the cholera is now raging) it commenced with the summer, and before winter set in, not one-third of the inhabitants were living; in Paris the massacre of the Jews was demanded, it being supposed that they had poisoned the wells; in London 50,000 persons were buried in one grave yard; in some towns not a human being escaped.

The year 1770 and 1771 A. D. were distinguished by a large comet being visible in the North Eastern hemisphere; an immense globe of fire was seen on the 17th July, and the most violent earthquakes, storms, rains, and inundations occurred, succeeded by intense heat and drought; the consequences were pestilences throughout Asia and the North East countries of Europe; 200,000 people perished in Russia and Poland; 1000 bodies were buried daily in Constantinople; in Bohemia 1,68000 died in one year; 150,000 in Canton; the streets of towns on the banks of the Ganges, were crowded with dead bodies, and such a number of carcases were thrown into the river, as to render the water and the fish unfit for use. The year 1817 was preceded by seasons of unusual moisture and heat, and a severe Epidemic, under the form of Cholera Morbus extensively ravaged Hindoostan; its general progress was along the margin of a river, over a swampy tract, in the vicinity of low sea shores, or within the delta of rivers; leading whole tracts and slips of country unaffected; being checked on its approach to high, dry, and cleared ground; affecting most severely the towns built on the ranks of rivers, after the eastern manner, with low, narrow streets, numerous stagnant pools, and no drains; and not passing as is the case with the yellow fever, the limit of 3000 feet above the level of the sea.

Numberless instances relative to epidemics might be adduced in support of our position; as also to demonstrate that the cause of the frequent depopulation of the city of Abydos was removed by draining the contignous marshes; that the cholera of Veracruz, and the Tieras Calientes is unknown on the adjacent cleared land of Mexico; that the plague in Egypt is owing to the slimy deposition of the Nile; the pestilences of Hungary, Russia, and northern Europe to the number of morasses caused by the inundations of the sea, and the frequent-overflowings of the rivers Danube and Neva; and the Endemics of Philadelphia, Gibralter, Jamaica, Rome, Java, Walcheren, Rangoon, New Orleans, Sierra Leone, Virginia, Calcutta, Milbank Penitentiary, Madagascar, Moorshedabad, China, the vicinity of the Caspian sea, and Bosphorus, Mozambique, &c. have been caused by the pestilential effluvia emitted from the adjacent swamps and marshes.*

In reply to the above general observations of the non-contagionists, and from which alone they draw their conclusions I have only to point out the fact already adverted to, of intermittent fever not only arising from atmospherical vicissitudes, but also being propaged by contagion; and to the same fact noticed in the cholera in Russia, and the dysentery of Ireland.

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* East India Magazine, 1837.

That eminent pathologist Mr. Broussais, no great advocate for contagion, thus expresses himself. 'We will admit that this kind of infection to which the name of contagion has been given, is not common, because a single patient is rarely a very virulent focus, but we shall avoid denying its possibility; facts will tell against us, and we are the slaves of facts. The contagionists are as amply provided with them as their adversaries, and a thousand negatives cannot destroy one affirmative fact.'

While cholera was raging in India, dysentery was committing fearful ravages in various parts of Europe, and in the British islands in particular. At Clonmel in 1818, Mr. Dillon calculated the deaths at one in ten; at Cork during the same year, Dr. Barry estimated it at one in three at the least, I never (he says) witnessed so fatal a disease. And to the same effect, in general terms, Dr. Cheyne, while practising in Dublin says 'I had often witnessed obstinate cases of dysentery but I had not formed any adequate conception of the horrors of that disease, until I saw the patients congregated in the wards of Whitworth hospital.'

Sir James McGregor in his account of the disease of the army in the Peninsula, mentions that in three years the loss from the ravages of dysentery was 4717; and Dr. O.' Brien calculates that the number of cases was 40,000.

According to Desgenettes dysentery made more havoc among the French troops in Egypt than the Plague; for while in a given period, 1689 were carried off by the Plague, 2468 perished from dysentery.*

Dysentery and cholera so run into each other that in the worst forms they are the same.

In England in 1670 this was the case; the patient sinking within 12 hours, the disease was called the white dysentery.

In diseases therefore so closely partaking of each others characters in their worst forms it is natural to expect that their contagious and non-contagious nature at respective periods of progress would present the same agreement; and as I have already shown that cholera becomes contagious when it has run into the febrile state, so dysentery, complicated with fever, presents a contagious character; and hence upon this view of the subject are reconciled all the discordant opinions, in the same manner, as I have shown them to be regarding cholera.

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* Good's practice of Physic.

While numerous medical men, viewing dysentery as a topical affection, deny its contagious nature, others who have witnessed it in all its forms consider it a contagious disease, as the following extracts will show:

Dr. Halleran of Cork, observes that it was obviously contagious on many occasions; Dr. Poole that it was contagious at Waterford; Dr. Dillon that it was the same at Clonmel; and Dr. Cheyne, (to whom we are indebted for the best, as well as the most extensive clinical history of this disease) that it was, at Dublin, in some cases contagious, and in some not, being decidedly so when connected with continued fever, and uncontagious in its simple form or when combined with an intermittent.

This view has the full countenance of an other very able and experienced writer of our day, Dr. O'Brien of Dublin, who says it may become contagious when epidemic and accompanied with fever in camps and crowded stations. Dr. Cheyne says I have analysed 98 cases; 33 arose during recovery from fever; 15 while the fever was in progress; 15 from cold, or cold and wet, four from indigestion. The rest were doubtful, but many had been exposed to febrile contagion, and nine in close communication with patients labouring under dysentery; four had had been nurses in wards where the disease occurred, four had slept with dysenteric patients, of whom one had used the same night chair.*

In the above description we have only to change the name and it will apply to cholera; in allusion to which the extract from the Russian report was given, showing that the consecutive fever was contagious and that the resulting disease was the reigning epidemic, thus agreeing with the above remark of Dr. Cheyne that many had been exposed to febrile contagion; the whole tallying with the observation of Sydenham, that dysentery is the fever turned in upon the bowels.

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* Dr. Good's Study of Medicine.

It has been already remarked that these epidemics have never* prevailed on the Neilgherry hills, but the foregoing observations will demonstrate the possibility of these diseases being conveyed thither by a body of men labouring under typhoid remittent, contracted *in the jungles below.*

In connection with the last, and preceding observations, the report of Mr Ogilvie of the Bombay establishment is worthy of particular attention, as illustrative of the principle of diseased action in cholera, and being an affirmative fact, a thousand negatives cannot destroy it; the following is an extract from it:—In October last, when the disease had almost disappeared at Tannah, the attention of Mr. Jukes was called to a case that had occurred in one of the apartments of the barracks of that fort, appropriated to European troops; this, owing to too late application, soon terminated fatally. Another case appeared a few hours afterwards, the subject of which was saved with much difficulty and, in the course of six succeeding days, no less than nine cases oocurred in the same apartment. The curiosity of Mr. Jukes was naturally excited to ascertain under what circumstance so much disease was produced; and, on examination the ward appeared to be both badly ventilated and too much crowded with men; the place was immediately evacuated, scoured, and fumigated, after which no other case occurred."†

In the march of troops, or large bodies of men through a country, it has often been remarked triumphantly, as a proof of cholera not being contagious, that the disease broke out when there was no communication with another body of men affected with it; but a moment's reflection should serve to show the futility of such reasoning; for, independent of the main body of men passing in the line of march, through numerous villages, where the cases (never heard of) of the typhoid form of cholera) may exist, I say independent of this, there are, in the rear a line of stragglers and camp followers, five times as numerous as the main body, extending from one encamping ground to the other, having communication with every passenger on the road, and entering the bazars and shops, or places of resort of every village on the line of march: and it is among these individuals the cholera generally first shows itself.

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* Cholera has only once occurred as an epidemic on the Hills, this was among the men composing the corps of pioneers at Connoor, *who had been previously much weakened by fatigue and Exposure,* and lost fourteen cases.

Only one case occurred at Ootacamund, and one at Kotagherry; and, on a former occasion, when the Governor's camp was attacked at the *foot of the Hills,* the disease was instantly checked on their ascending, no new cases occurring and those previously attacked rapidly recovering.

Fever is unknown on the Hills, except when contracted previously in the low country.—*Baikie's Observations on the Neilgherries.*

† Corbyn on Cholera, p. 73.

Dr. Corbyn,* in allusion to the opinion of Dr. Scot† regarding the contagious nature of cholera, thus expresses himself, " Mr. Scot:— therefore, concludes, that it may be consequently inferred, either that the disease has been propagated by infection or contagion, or that its progress is owing to circumstances beyond our knowledge."

Dr. Hawkings on the Russian cholera states the following in reference to exemption.

" The Moravian colony, on the right bank of the Wolga, and several German colonies in the Government of Saratov, around which the disease was violent, adopted the system of exclusion, and remained free from the disease.

" At Caramala-Gubeewa, some Russian peasants living together, scarcely a hundred yards from the river, shut up their hamlet on the first report of the disease having appeared in their vicinity, and, by enforcing a strict quarantine during the prevalence of the epidemic remained in health.

" The large establishment composing the academy of military cadets at Moscow, was preserved by a similar plan from the scourge which was so active on all sides of it.

" When the cholera approached the city of Aleppo, Mr. De Lesseps the consul of France retired, in company with all who wished to be of his party, to a garden at some distance from the city. His asylum, was enclosed with walls, and was surrounded by a large fossé; there were only two doors, one for entrance, and one for going out. As long as the malady lasted, he admitted nothing to the enclosure without submitting it first to the precautions observed in Lazarettoes. His colony comprised *two hundred persons*, and consisted not only of Franks more or less acclimated, but also of several natives. *Not a single individual contracted the disease;* while at the very time within the city, four thousand beings perished in the space of eighteen days."

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* Corbyn on Cholera,

† Scot's Report on Cholera,

Many other instances might be adduced, but one affirmative fact even ought to be sufficient, when in accordance with the physiological explanation which I have attempted to give, and by which to show, the inconsistency of denying in toto the possibility of any one disease being propagated by contagion.

I have shown, on indisputable evidence, that epidemic cholera, epidemic fever and epidemic dysentery, may all be propagated by con-

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NOTE.—The epidemic still appears to be spreading to the westward with undiminished violence, as shown by the following statement:—

All accounts concur in representing the cholera as raging with considerable violence in many parts of the Deccan; and it is at this moment causing great mortality at Poona, and the country around. The daily deaths at Poona are numerous, and, within the last few days, they have been on the increase. This dreadful disease has also visited some of our regiments that are now moving through the country. The 18th Regt. N. I. has, it is said, lost 50 men, and a large number of followers, in a few days; and the 19th Regt. that lately marched from Poona, has also suffered considerably.—*Bombay Courier, November*, 1837.

NOTE.—While the epidemic appears from the foregoing report to be still progressing towards the western from the eastern coast in the manner it usually has done during the prevailing constitution, it also has given many evidences of its extension being assisted by human intercourse, or contagion of which we have already given one instance, as occurring at Bhophal, and now adduce another—

The 18th have suffered severely from cholera, on their march from Kulludghee to Belgaum and Vingonla. It has been stated from authentic sources, that 59 effective men and 69 camp followers have fallen victims to this destructive epidemic.

The disease first appeared at a town (on the 2nd day's march) called *Huskotta*, which is reported to have *lost many of its inhabitants* a short time before, from the same cause.

tagion, under certain circumstances; these certain circumstances, the non-contagionists have entirely overlooked; and, without any particular or urgent object in view, declared, in the most sweeping manner, that cholera is not contagious; and this they do from apparently considering it a disease sui generis, and governed by laws distinct from those of every other; not reckoning the possibility of its being a severe type of febrile collapse, which I have endeavoured to demonstrate is the case.

To recapitulate therefore, I will again observe that the same reasoning applies to all the forms of the epidemic equally as to cholera. Cholera may be placed at the root of the epidemic tree, pestilential fever, at the extreme branches; circumstances of time, place, and severity modify and multiply without number the innumerable forms of the epidemic that occur between these; hence the rapidity of death in one instance, the celerity of recovery in another; in neither of these does the disease contribute to its own propagation; because in both it no longer exists: but when cholera becomes protracted, assuming the characters of malignant fever, then, as a necessary consequence, it propagates itself.

On the arrival of the Regiment in the vicinity of Belgaum, it was considered advisable to put them under quarantine, and prohibiting any person from camp, visiting Belgaum or its neighbourhood. I believe the generality of medical men in India do not consider cholera a contagious disease, yet there can be no question of doubt but that the measures adopted by the authorities were judicious and well adapted for the exigencies of the case.—*Bombay Gazette, December* 4.

NOTE.—The cholera has at last reached Bombay, and daily carrying off the inhabitants. December, 1837.

I have alluded, as may be observed, to these reports to show its progress westward steadily from place to place, and more for the purpose of drawing attention to the subject, than deducing fixed criteria from them; because, ignorant of all the attendant circumstance of locality, winds, population, famine, &c. it would be presumptuous in me to draw conclusions in reference thereto. My remarks have applied to the physiological characters of the epidemic in its different stages and forms in reference to its being sometimes propagated by contagion, and to the fact that the contagion of fever produces cholera, a circumstance which should never be lost sight of; for, if it is, every thing appears a mass of confusion.

The liability to receive infection may be obviated by proper care, and even the ability of the disease to propagate itself may be in a great measure entirely prevented by prophylactic measures, but this is no proof that a disease may not, under certain circumstances, contribute to its own propagation.

Vaccination will in certain seasons and in certain localities* constantly fail; or small pox may rage in a populous community and yet few comparatively be attacked, but these are no proofs that the virus of each will not be energetic under other circumstances.

Or we might as well deny the existence of febrile miasm in a place because by proper care and the use of febrifuges a person may escape the fever.

Miasm or malaria may be considered a matter of ferment or yeast that propagates itself with an energy proportioned to the medium of development. We perceive it productive of all the varied forms of the pestilence according to the intensity of the febrile constitution, in one place giving rise to diarrhœa, in another to dysentery, in another to cholera and in a fourth to fever, and to all the various forms of these.

The body in the latter stages of fever may be compared to a marsh sending forth malaria, but of a more concentrated kind as coming through a more perfect medium of reproduction and propagation. This malaria, in the present state of my information, I will call leaven or ferment, as I consider it acts on the system after the same manner that it does in its own reproduction. Hence the constant decomposition of the fluids more or less that accompanies every form of the epidemic, especially remarkable in the contents of the bowels in the choloroid inclination of the epidemic, and in the circulating fluids in the other. The gaseous products, the constant result of this fermentation of the contents of the bowels, are, in the choloroid diathesis, often the cause of death in the way of irritants to the whole mucous membrane; and poisons to an equally extended surface, the cause of the crowded assemblage of varied symptoms. The discharge of the contents of the bowels is followed by relief. This is my principle of cure, but (observe well) by means agreeable to the sick, and which relieve his destroying thirst.

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* Vaccination, I have heard, does not succeed at Moulmein. This must result from the decomposition of the virus, which might be easily preserved in mercury at all times.—P. S.—Since this was written, a letter signed D. Stewart has appeared in the *Englishman*, stating that vaccination has now succeeded at Moulmein.

Carbonic acid gas carburetted and sulphuretted hydrogen, when evolved in excess in the primæ viæ, act as poisons. They exist here naturally in small quantities with impunity, but their excess is fatal to life. The system I pursued and as successful (in my own case), carries away all these poisonous irritating products from the first passages, and leaves in their place a bland and healthy fluid, which, being also partly absorbed, thins the blood and re-establishes the circulation.

Again, let it be recollected, that he who denies that cholera ever conduces or assists in its own propagation, is merely saying that fever is not contagious in the collapse stage, a circumstance with which every one is, or ought to be, familiar.

SECTION VIII.

WESTERING INCLINATION OF THE EPIDEMIC.—INFLUENCE OF THE EAST WIND.

The epidemic has generally, indeed I believe almost always been observed to arise, commence, or become aggravated during the prevalence of the east wind.

It has also been often remarked that it has been observed to spread in the "teeth of the most powerful monsoons."

In regard to the last mentioned circumstance it does not appear to me that there is much difficulty in accounting for it, in naturally supposing that a poison would be more active when concentrated than when diffused and diluted in its progress to a distance from its source; independent of the influence of human intercourse, under certain aggravated conditions, and of intermediate unhealthy localities; as also of the constant variation of the atmospheric current which would thus, when shifting in the least, affect those points furthest from its source first, and gradually the other intermediate portions onwards successively, till the whole line of country became affected up to the original source which remains fixed. And so it might blow to all parts of the compass, in succession, regularly affecting, in the same manner, ranges of country parallel to the original current; while those portions in the direct line of the breeze would also be under its influence. To understand this, draw from the *fixed* source of the original current a quadrant of rays, and, parallel to the first, a line at a short distance, intersecting all the others, representing the line of country. The most distant of this line will be first in contact with the changing current, how minute soever that variation may be, and the last affected portion will be nearest the original source, thus giving the appearance of the epidemic "spreading in the teeth of the most powerful monsoon."

But the ordinary influence of atmospheric currents is sufficient to account for the phenomena displayed, for we perceive their effects correspond with their direction and duration; and the dissemination of the epidemic to be propagated towards the point to which they blow; as well as that they display a more powerful influence the nearer their origin is approached. Hence, as the general direction of atmospheric currents is from the east towards the west, so we perceive the spreading of the epidemic has pursued a similar course, increasing in severity in those situations favourable to the intense development of the febrific constitution. The healthiest countries in the world, therefore, are only healthy as respects their relative situation to other countries from which the wind may blow; hence those removed beyond its influence are found to escape the visitation of those epidemics which are constantly travelling from east to west within the sphere of its influence. Knowing the general direction of the currents of the globe, we have only to look at the map, and, taking *all* collateral circumstances into consideration, to account for the phenomena displayed in the spreading of epidemics.

If we take any country in the world, and consider it in reference to the east and east wind, we will cease to wonder at the influence of the latter in the production of disease, or be at a loss to account for the general spread of epidemics from the east. Let us, for instance, look at the position of the Indian empire, and what I have said will be at once apparent. We perceive it situated at the apex of an isosceles triangle whose two sides are seen extending respectively over an extent, in a direct line, of 100°, and more, and whose base has a breadth at least of 120 degrees. Through this triangle, or rather funnel (in the chimney or throat of which is situated Hindostan), blows, nearly constantly, the easterly winds, conveying ever and anon the profuse exhalations from the interminable series of islands, bays, swamps, rivers, morasses, forests, &c. spread out in the course of its progress over the extensive tract alluded to. The northern alpine boundary of this triangle presents a distinct line of separation, and constantly conduces to the prevalence of north easterly currents, while the east wind itself is the prevailing wind within the tropics, and over the southern limb of the triangle the south east or E. S. E. wind must likewise travel over an equally unhealthy series of islands before it reaches Hindostan. Almost all the islands, peninsulas, and the continent, included within the space pointed out, are far from maintaining a salubrious character, and are at times proverbially unhealthy; cholera and influenza, ague and dysentery, prevailing now in our times, and having prevailed also from time immemorial. Over the extensive tract alluded to, must the east wind constantly blow, and as constantly convey towards the west whatever influence it may have acquired? That this influence can be salutary it is as difficult to suppose, as it is easy to conceive that it must be quite the reverse. With this wind did the epidemic become aggravated in 1817, and continue constantly to spread under the influence of the same, assisted by other circumstances, as I have pointed out.

The influenza, which is one of the epidemics of China, pursues its course to England and France (through Russia), which it generally reaches in the second year.*

The epidemic catarrh, which prevailed at Penang in July and August, 1831, was found to extend over a space of 600 miles;—one hundred thousand individuals were attacked, it prevailed during the blowing of south-easterly winds, and ceased on the change of the wind to west and north-west.†

In the atmosphere, heated air is constantly rising and colder air rushing in to supply its place, which is the principal cause of winds; the air that flows from the poles towards the equator, in consequence of the rotation of the earth, having less motion than the atmosphere into which it passes, occasions an easterly current. The air passing from the equator towards the poles, having more motion, occasions a southern current. By these changes, the different parts of the atmosphere are mixed, cold is subdued by heat, moist air from the sea is mixed with dry air from the land, and the great mass of elastic fluid surrounding the globe is preserved in a state fit for vegetable and animal life. In the Torrid Zone, when mountains do not interfere, the winds follow the sun, and blow constantly in the open seas from east to west; the sun rarifies the air as it travels westward, and the air constantly follows it. This extends about 25° or 30° on each side of the equator. Below latitude 30° there is a general tendency of the wind to blow from the south and south-east. There is always an upper current blowing contrary to the trade winds.

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* T. M. & P. S. C.—Dr. Pearson. † Do.—Dr. Ward.

The constant regularity of the trade winds produces other winds to the north and south, tending to maintain the general equilibrium, and they are varied by the greater heat which arises from the reflection of land, and in particular by large extents of land; also by mountains and by plains, and by the alternate heat and cold of seasons.

In the Indian ocean the trade winds are disturbed by the mountains, and by large tracts of land presented by Africa and Asia; hence, in maintaining the equilibrium of the atmosphere, the wind, instead of blowing from east to west, takes opposite currents for six months, and, at the times of change, they produce tornadoes and storms, by what are called the breaking up of the monsoons. To the south from 10° to 23° the wind blows constantly from the east and south east, because the lands do not much interfere, but, from 10° northward to the equator, north-west winds blow from October to April, and south-west from April to October, and north of the equator to the Tropic of Cancer, south-west winds prevail from April to October, and north-east winds from October to April.

As the winds over a breadth of sixty degrees, blow with slight interruptions from east to west; so, in the northern and southern hemispheres, the atmospheric equilibrium demands that the prevailing winds should be from west to east; and therefore, for the most part, westerly winds prevail for two-thirds of the year; and they thus enable ships which sail to the West Indies by the trade winds to return to the east by first ascending to the latitude of 40° or 45°.

The west winds in Europe diminish more and more as the centre of the old continent is approached.

They are more frequent in England, Holland, and France, than in Denmark, and in the greatest part of Germany; and they are more frequent in the last than in Sweden and Russia. In London the east winds, N. E. E. S. E. are to the west winds N. W. W. S. W. as 1 is to 1:7 at Amsterdam, as 1 to 1:6 at Copenhagen, as 1 to 1:5 at Stockholm, as 1 to 1:4 and at St. Petersburgh as 1 to 1:3.

Yet these may be considered as branches of the general current which sweeps from east to west; or like the eddies of a great flood which sweep backwards along the shores, and fall again into the general stream to perform the same revolution.

These may have an influence on sporadic or endemial diseases, but cannot have the power of swaying the extension of epidemics from east to west.

When cholera appeared in London, it was during the prevalence of an east wind. Dr. Prout says: " About the ninth of February the wind in London, which had previously been west, veered round to the east, and remained pretty steadily in that quarter till the end of the month.

Now, precisely on the change of the wind, the first cases of epidemic cholera were reported in London, and from that time the disease continued to spread.

And, in 1817, when the cholera reappeared in India in an unusually severe and extended degree, the usual west winds had ceased and they blew from the east. Dr. Scot in his report says: "In 1817, however in May, there does not appear to have been one day of westerly wind, in 1818 there were likewise none, and in 1819 there were only three days westerly wind. A remarkable deviation, therefore, would seem to have taken place in respect to the winds in the month of May at Madras, in the years 1817 1819, which were the first years of the epidemic in India, although it did not reach Madras till the following year in the month of October."

The season, however, was no less unhealthy, the stage of reaction of the epidemic, was speedily developed, and fever prevailed to a great extent. The celebrity and fatality of what was called the Nagpore fever, formed the theme of many a long dissertation, and will never be forgotten by those who witnessed it. In the same year the station of Ganjam was abandoned as untenable on account of the fever.

Dr. Corbyn states, from the various accounts of the rise of the cholera, in different parts, that it appears in a great majority, the east wind was blowing at the time.

This was, almost without exception the case in Bengal; at Calcutta and Nuddea, the epidemic began to decline in virulence on the setting in of the north wind, and to recommence its ravages with the recurrence of the south-east wind. The same prevalence of easterly and south-easterly winds attended its progress through Tirhoot, Sarun, Bahar, and Shahabad. The disease, there is ground for believing, began to rage in the camp of the centre division of the army, immediately on the west wind giving place to the east, which also seems to have been the prevailing wind for some time before its appearance at Buxar, Gazeepore, Mozufferpore, Jypore, Agra, and other parts of central India."

During all this period fever was raging both before, along with, and after the cholera.

Not only in India, but in Europe it was committing ravages also of fearful extent, attended with dysenteric symptoms, and even with cholera.

There were more died of the fever than of the cholera afterwards; and even during the prevalence of cholera in Russia there were, in certain localities, more deaths in the consecutive fever than in the stage of collapse.

The Russian report mentions that, in the practice of some physicians, of 20 cases 13 died of the consecutive fever.

It will be a hopeless case I fear, to find a separate cause (a separate malaria) for fever, cholera, ague, and dysentery, and all their forms; and these all existing at the same time during the prevalence of an east wind. If we refer to any single report on the epidemic, what I have pointed out will be immediately perceived.

For instance, in the Madras report, the following occurs:—" The magistrate of Ganjam, in a letter dated 20th March, 1818 states, that the inhabitants had suffered severely from fever and cholera."

Again, " during the march of H. M. 69 Regiment from Bangalore, it is stated

From	12th.... October	to	28th ... October.	Dysentery	prevailed.
,,	28th.... October	to	13th.... Nov.	Cholera	do.
,,	13th.... Nov.	to	24th ... Nov.	Dysentery	do.

,,	24th.... Nov.	to	3rd... Dec.	Ague	do.
,,	3rd .... Dec.	to	[illegible]	Dysentery	do.

This is one of a thousand, nay, ten thousand instances which are daily and hourly occurring.

These are all variations of the same epidemic, and which, on a small scale, we daily see developed in sporadic cases of disease; and which, in the Russian cholera, was memorably displayed in the fatality of the febrile stage, or what is called the consecutive fever.

Also in the fevers which occurred in London, and other parts of Europe, in 1817-18, and 19, which were called fevers, complicated with abdominal affections, &c. from the circumstance of ulceration of the intestines, with gangrene and perforations, being found after death. The subjects of these fevers were rarely admitted before the 8th, 12th, or 15th day, and often as late as the 22nd, and therefore the medical men laboured under great disadvantages from the patients not being able to give any proper account of the disease, or how it commenced, because it never occurred to them that in diarrhœa, at the first, the intestines, could be so injured, without severe pain, so as to cause their principal disease, while the apparent one was debility and fever.

But the graver form of the same has been exemplified in the Russian cholera, where the proportion of 10 out of 20 died in the consecutive fever.

And the proverbial stamina of the Russians was no doubt another reason of their frequent passage into the stage of pyrexia.

In the report of the Holy Synod, published in 1827, we find that during the year 1825, and only among those of the empire who profess the Greek religion, 848 men had reached upwards of 100 years of age, of this number, 2 had passed their 120th year: four from 130 to 135. Out of 606,818 men, who died in 1826, 2785 were above 90; 1432 above 95, and 818 above 100 years of age. Among this last number, 88 were more than 115; 24 more than 120, 7 more than 125, and one had attained the age of 160.

The disease, therefore, will present different characters in different countries, that is to say, it will be severer in some than others proportioned to the stamina of individuals, as well as to the salubrity of the countries affected. Still these do not change the characters of the malady, they only modify its symptoms, so that we see on the same line of march of a body of men, both cholera, dysentery, and ague prevailing, according to the salubrity of the district through which they passed, as well as to the varying activity of the epidemic constitution. Hence troops may remain healthy in districts of equivocal salubrity, until the prevalence of easterly winds, when disease breaks out from the united influences of locality and epidemic constitution.

In reference to the disease, therefore, its consideration as confined to one district, or country, will throw no light upon its real nature, as well as that the partial laws which govern its development in particular instances, will not illustrate the epidemic in its universal character. The partial influence of the atmosphere, for example, is constantly fallacious, for it is ever varying, and the wind often circulates in continued circles presenting the supposition of opposite currents, from different points of the compass.

Dr. Prout indeed says: that "The same causes are constantly operating in different forms and degrees, so as to produce all the infinite variety among the winds, which we observe in nature. These are so numerous and diversified as actually to baffle all attempts at explanation or arrangement."

Hence we have seen in the spreading of epidemic cholera, that its methods therein are so numerous and diversified that they baffle all description.

But when we come to regard the general currents of the atmosphere, we find them adhering to certain laws; and likewise when we come to consider cholera in a general point of view, we, find that it has steadily progressed towards the west, however tortuous the road that it travelled.

In the temperate regions of the earth the winds seem to obey no certain laws, at least laws so determinate as those of the trade winds. But about the tropics, both in the northern and southern hemisphere, the operation of the double currents and motions before described, becomes distinctly perceptible. Thus, about the tropics, the surface of the earth begins to move faster than the incumbent atmosphere; and hence, in these regions, the prevailing winds are from the east. Indeed, near the tropics, the currents are nearly due east, principally on account of the great, and somewhat sudden change of temperature produced by the vertical sun of the tropical regions, which may be supposed to interfere with, and perhaps to check momentarily, the regular progress of the great northern and southern currents. As we proceed, however, towards the equator, in both hemispheres, the atmosphere gradually acquires the velocity of the earth, while the intensity of the eastern current diminishes in the same proportion, and at length entirely disappears. At the same time the currents, from the north and south continuing, slowly deflect the currents, from the east towards the north in the northern hemisphere, and from the east towards the south in the southern hemisphere, till left alone by themselves the polar currents proceed onward towards the equator, as if the motion of the earth had no existence.*

The above would appear to suffice to demonstrate the unavoidable tendency that epidemics must always assume of spreading from east to west whether they originate in the old or the new continent; and that they must follow or be carried along with the general current which follows the sun without ceasing round the globe; independent of the innumerable and minor currents that they may happen to meet with in their westward course. Yet these obstructions, although they do not alter the general direction, still exert a partial influence: hence we have seen that Italy escaped for a while the visitation of the febrific constitution; but now it would appear that her atmosphere has at last also partaken of the epidemic or febrile leaven. Palermo and now Rome have suffered severely.

Her partial exemption is explained by her situation beneath the Frigid Zone of the alpine ranges which influence the atmospherical currents of that portion of Europe as the reduced temperature at the poles do the general currents of the globe.

The currents round these regions of perpetual snow, would present circlcs like the general ones from the equator to the poles forming an atmosphere of their own, often independent of the winds at their extreme points.

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* Dr. Mc Cosh's report I think states the easterly wind to blow 9 months of the year in Assam.

The febrile constitution of the atmosphere, exerts a rapid and general influence, and not only was fever predominant in India, before and in 1817, but both epizootics, and endemics prevailed in various parts of Europe. Dr. Ayre states—"The very term collapse, which is now so distinctively applied to the first or blue stage of the present epidemic, was first employed by me to designate that stage in the English disorder, whilst the fever, now termed consecutive, was especially noted as of frequent occurrence. It may also be added that, the materials of my work, which was published in 1818, were collected in 1817, and derived from observations made upon an epidemic cholera, which prevailed that year in Hull, and other parts of the United Kingdom."

So we thus see, that the gradual spread of the great epidemic, was courted by the reigning constitution, as it was at first in India.

Two instances among thousands I have mentioned as illustrative of this, viz., the fevers of Nagpoor and Ganjam which last was abandoned on account of its unhealthiness, previous to the fever beginning to prevail with an aggrevated cold stage.

Under the head contagion, the few brief remarks will contribute to demonstrate the fact of effluvia from the sick, in the graver forms, lending their aid to the propagation of the pestilence.

As in temperate climates the changeable character of aerial currents is such as to baffle all attempts at a regular classification or arrangement, so, in the progress of epidemic cholera, we meet with a corresponding vicissitude. Even within the tropics its progress, though more regular, has often presented considerable irregularity, depending upon the influence of atmospherical currents which have escaped observation, to say nothing of the periodical changes of the wind both from the influence of the sun as north or south of the equator; as well as the monthly variations from the influence of the moon; together with that of the land and sea breezes; and currents produced by ranges of lofty mountains, &c., all which must have an effect both upon the condition of the particular countries, and the health of their inhabitants.

Independent of all this, it is a fact that the monsoons have a quite different character now to what they had 25 years ago in every particular; all who have sailed much within the tropics state this; it was from sailors I had the information. Even the influence of these changes are not only not known, but their influence not considered.

Therefore, while we continue unable to follow or trace all the currents of the atmosphere, or as Dr. Prout says while these are such as to baffle all description, we need not wonder when the spread of the epidemic is also often such as to baffle all description. The progress of cholera has been a theme which has engaged much attention, but, save marking its appearance at particular places, no light has been thrown thereon. I see no other way of rationally viewing the spread of the epidemic, (which has been the subject of the foregoing pages) except in connection with, and depending in a great measure, on the eastern currents of the atmosphere which, constantly seeking the sun, move as constantly round the globe. Forgetting this constant motion westward of the great stream, and the ever changing character of the lateral currents, the histories of the progress of the epidemic cannot fail to present pictures replete with apparent inexplicable confusion. From many I have selected the following as worthy of record.

" A letter from Mr. Tricoupi, the ambassador of King Otho, to Lord Palmerston, has just announced the terrors of Greece at the approach of the cholera. Quarantines, cordons, and all the usual and wholly impotent precautions are provided, and the ships and travellers of taly are warned off the coasts of the Hellénic Kingdom. Of all diseases this is the most extraordinary. Capricious, yet constant; partial, yet finally universal; slight in some parts of its progress, overwhelming in others; passing through all climates, influenced by none; a winter endemic in one land, a summer scourge in another; seizing alike on every country and on every species of population; sometimes yielding to the most trivial remedy, sometimes baffling the most approved. Utterly defying all systematic cure, it remains now, after half a dozen years of its traverse through the world, the same mysterious, resistless, perpetully moving calamity. A map of the cholera would comprehend almost every region of the civilized world, but the strange diversity of its course alone would make it memorable. Beginning in central India, pouring over the range of the Himmaleh into the wild plains to the North, and terrifying the hordes of Tartary. Then shaping its course to the westward, and destroying all within that course to the head of the Caspian. Turning thence more directly on Europe, and falling on St. Petersburg, Moscow, and the central provinces of Russia, it paused for a while within the Russian empire, as if to give time to western and southern Europe to prepare. Then suddenly spreading along the northern shores of Germany, and consuming the squalid population of their commercial cities, it came unaccountably among ourselves.

Its visitation in England was remarkable for its mildness, for its limitation to particular districts, and for its singularly capricious seizure of individuals. At Newcastle, while it fell heavily on one-third of the town, the other two districts comparatively escaped. In London the seizures were chiefly in the narrower parts of the city, and the suburbs stretching along the river-side. The only characteristic of the disease yet distinctly ascertainable is that, it exists with almost unfailing power in the vicinity of great rivers. Beggary, squalidness, nakedness, and intoxication are all in danger of attack. But damp and discomfort in the neighbourhood of great rivers appear to render its ravages almost inevitable.

From the North of Germany it divided into two branches, one taking its course to England, and one sweeping to the south—the central provinces of Germany suffered heavily, and Vienna lost a vast number of its poorer population. From Vienna, again returning to the north, and crossing the Rhine, it entered France, passed through the provinces with camparatively slight mortality, but fell upon Paris with redoubled venom. The mortality in that capital was unequalled; within a few weeks twenty thousand died. The disease then seemed to pause. It suddenly started up in America, transferred, none knew how; after ravaging the United States, it crossed the lakes and the St. Lawrence, and spread terror through Canada. From Canada it made its way through the forests, and destroyed a portion of the Indian population, which might have seemed to defy the inflictions of Europe in their unfathomable solitudes. But the cholera was not to be escaped, and the mortality was deeply felt among the thinned tribes of the vast country stretching in the rear of the United States. Thence by a sudden spring it fell upon Mexico, the Havannah, and the Spanish settlements south of the line, finally wandering away into the deserts, until life went out and disease could slay no more. It then crossed the Atlantic again, and threw Europe into new alarm at a disease which thus seemed to be marked for the perennial scourge of the earth. But its visitation, as it passed along, was now slight until it reached the confines of Mahometanism. There it swept all before it, as if kindled from some new furnace of wrath, it devastated Egypt by thousands and tens of thousands. From Egypt it ascended to Constantinople. There it rivalled the plague. Multitudes perished. It then partially returned to Russia and Germany. In the Polish war it fearfully increased the miseries of that time of wretchedness and blood. Constantine, the archduke, closed his half insane and tyrannical life by it; and Diebitsch, the famous passer of the Balkan, with a large share of the Russian army, were carried to the grave along with him Spain, Portugal, and Italy, still had escaped, and the world was asking by what means this singular preservation was effected: when the cholera broke out in Lisbon—from Lisbon it passed to Madrid, and from Spain to Italy. In Italy it is now raging. The east coast has been seized within these few months, and Greece, the nearest shore, trembling, is adopting measures of precaution. Bosnia and the wild country bordering on the north of her kingdom, is already seized, and thousands are perishing day by day. When the science and comforts of civilized countries have been so ineffectual, what resistance can be made by the ignorance, and wretchedness of barbarism. The disease will take its way through the wilderness, and cease only, as it ceased in South America, by its going beyond the confines of man.

In this sketch, which of course has merely traced the leading lines of its progress, we have a view of the most extraordinary operation on human mortality within the history of our species. The great plagues which have visited Europe since the fall of the Roman

Empire, have all had nearly a common character. All have fallen with more or less violence, upon the extremity of the continent, when it touched upon the realms of Mahometanism, always the original soil, of the disease, and have thence gone regularly on covering the earth with corpses, like the march of a destroying army. In the lesser plagues particular cities were ravaged, as in the plague of London, and like the violence of fever in a sick chamber, the disease terminated with the death of those seized within the limits, all beyond was harmless. But the cholera more resembled the floating of a cloud charged with elements of death,—here scarcely shadowing the atmosphere, there turning it into utter darkness :—in one region sweeping onward with an uncontrollable rapidity, in the next lingering till it almost ceased to move. *Carried as if by the chances of the wind,* passing by kingdoms that lay directly in its path, hurrying to others across mountains and plains,—apparantly omitting some whose poverty contained every predisposition for disease, and fixing on others where every human power was ready to repel its devastation yet finally smiting all.*

In India on a smaller scale, the epidemic presented the same apparent versatile character, but holding true to its attachment to the districts most obnoxious to fever. While in the Madras presidency fever was the prevailing form, cholera was raging in Bengal, whence it overspread the country, leaving one place to attack another, and again returning ; devastating distant stations at the same time, sometimes giving place to fever, and this again to the prevailing epidemic ; again dying away in dysentery, and diarrhœa, and again assuming the ascendancy. The reports of the three Presidencies, particularly the Madras, exemplify the true character of the epidemic in the strongest light, particularly in the marching of corps, to one of which I have already alluded, exemplifying the principle of the reigning constitution ; not as consisting of many distinct natures, one producing fever, a second diarrhœa, a third dysentery, and a fourth cholera, but as being the febrile constitution.

The invasion of cholera in Bengal was also preceded by a Bilious Remittent fever of a violent inflammatory type, accompanied like the yellow fever of the West Indies, with suffusion of the skin, raging epidemically in every town and city between Patna and Saharanpore, more fatal than the cholera itself. Of four Kings corps at Cawnpore 1000 were taken ill, and the 87th and 66th lost, from the time of their reaching the station, nearly 400 men. The former corps is stated to have had 519 in hospital at one time, to have buried 21 persons (including women and children) in one day, and upwards of 90 of its number within the month.

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* Blackwood, 1837.

The stations chiefly affected wore a gloom hardly to be conceived. Of numerous native villages, nearly the whole population was ill at one and the same moment, and many of the shops were shut for want of people to attend them. The banks of the river were covered at all times with the dead and dying, such had been the ravages of this dire distemper.

A similar mortality, preceded by great scarcity of grain, prevailed about the same time in Cutch, Sindh, and the other states bordering on the western side of India, which was by the natives ascribed to the plague.

It is also said to have depopulated several cities, so that the living were unable to bury the dead.

Throughout upper Hindustan it was observed that horned cattle were very sickly at this period; their bodies could be seen by passing travellers strewed in vast numbers in the pastures.*"

Such was the direful effects of the reigning constitution in 1816, nor did it cease, but low fevers, diarrhœas and dysenteries continued to prevail, till the system, no longer able to make head against it, sunk at once into the collapse of cholera.

In the following August (1817,) the cholera broke out during the prevalence of the south east wind,—much rain had fallen, the middle of the month was hot and oppressive, and the nights sultry.

This febrile constitution of the atmosphere not only prevailed in India before the cholera became general, but was causing similar unhealthiness all over Europe, as I have already mentioned. And as it assumed its graver form in India during the prevalence of south easterly winds, blowing from the unhealthy tracts of the

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* Corbyn on cholera and Jemeson's Report.

Eastern peninsula, so from India it continued to be propagated in a similar direction, and shaped its course along the Persian Gulph and Caspian sea into Europe.

The cholera to which I have already alluded as lately making its appearance on the eastern coast keeps still progressing towards the west as the subjoined extracts from the Bombay papers demonstrate;* thus displaying the invariable tendency it has shown to spread from east to west under the united influences of atmospherical currents, contagious effluvia, and terrestrial agency.

In a short practical essay, like the present, it would be out of place and void of utility to enter into the consideration of the nature of the active principle in this epidemic constitution. The latest observations on this subject are those of Dr. Prout, who had also remarked the breaking out of cholora in London, during the prevalence of an east wind, when the atmosphere became increased in weight by the diffusion of a body heavier than the displaced air.

The singular and undoubted fact of the epidemic constitution becoming aggravated, or of greater intensity in the vicinity of rivers and collections of water of all descriptions, would seem to demonstrate the existence of an agent possessed of reproductive powers which appear to be immediately called into action the moment it meets, in its course, with bodies favorable to their development.

The fact of the exemption, from the influence of the epidemic constitution, of those who protect themselves with a covering of cloth or gauze would seem also to point out the existence of a palpable matter, widely different from a gaseous fluid, the heaviest of which penetrate the tissues of the body with great facility, and hence could not be excluded by a covering of gauze.

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* The Pilgrims returned from Venkohas Giree inform us that the cholera was making great devastation in and about that place, and the loss of lives was reported to be very great.

A private letter from Kulladgee mentions that about 100 men died of cholera there, and about 150 at Luckapoor, a village not far from it.

It is reported here that many are daily dying of cholera in the 18th Regt. N. I. en route te Borada now at Sutteegaree, a village about 36 miles or this side of Kulladgee.

Nov. 1837.

Substances with the properties of animal matter have been detected at various times in the atmosphere, especially in unhealthy districts.

Mr. Boussingalt detected a carbonaceous matter in dew, while in other experiments this matter had an animalized appearance.

M. Rigand de Lille discovered on the marshes in Languedoc, a liquid which putrified very readily, containing flocci of matter having nitrogen for its base, and giving with nitrate of silver or precipitate which passed rapidly to a purple colour.

It will be perceived that I have adverted to these circumstances; 1st, as leading to advantageous results, in directing the attention to the possibility of excluding the morbific particles from the air passages, in other words that they do not pass through the tissues of an external covering; and this in reference not only to individuals, but large bodies of men residing together where the application of the same means of exclusion would be equally effectual in preventing it traversing their places of abode; more especially applicable during the night, when the epidemic invariably is at its acmè.

2d. As showing that if this animalized matter, or matter of animal origin or ferment, or fibrine, or a substance analogous to it, be the catalytic agent or active principle of the epidemic constitution, its confinement below certain ranges of elevation is accounted for, as well as the speedy development of its powers in the vicinity of water; where its production must constantly increase in an inconceivably rapid degree, unless dissipated by contrary currents, or washed to the earth by a heavy fall of rain.

3rd. That as it exists in the air as proved by the foregoing experiment of Mr. Boussingalt, and others, it must of consequence be carried in the direction of the wind; and may either be precipitated on districts, where, wanting moisture, it will be harmless, or it may rest upon a collection of water, a river, an inlet, or a damp situation where its properties will be immediately developed, and, like leaven, soon leaven the whole mass.

I have briefly adverted to the motion of the earth, the heat of the sun, the diminished temperature of the poles, also to ranges of mountains, and consequent level tracts of country as influencing the prevailing currents of the atmosphere and determining the spreading of the epidemic which is this year again, as yet on a smaller scale, spreading towards the western provinces of central India.*

It only remains to advert to the influence of the moon, in reference to the same subject, in the following brief remarks.

It must be admitted, although we have mathematical demonstration for the action of the sun and moon on tides only, that great variations take place in our atmosphere from lunar influence; even though that influence acts less strongly in the temperate Zone than between the tropics, and the causes which modify it are but imperfectly appreciated. Nor is it very wonderful that so magnificent a body, with a gravitation that occasions the flux and reflux of the sea,—and with such perplexing irregularities in her motions, as are occasioned by her different distances in apogee, and perigee, the erection, and the coincidence of the line of apsides with the syzyges should exert a perturbing force on the elastic fluid in which we are enveloped, a fluid easily displaced, and so expansive, that it can occupy a space 780,000 times greater at one time than another.

Is it then surprising that such a region should be affected at full and change? Or that severe gales should be expected by seamen at the new and full moons of March and September? It is often found that with each monthly revolution of the moon in the Zodiac, during the fourteen days she is to the north of the equator the winds prevail from the south east round by south to the west point of the compass, with humidity, rain, and a low barometer; and that during her southern course, the winds veer to the north-east, north, and north-west, the mercury rises and the weather becomes fine, even though gales may blow.†

From the few foregoing observations, therefore, it appears that the general inclination of the epidemic towards the west has hitherto corresponded with the great current of the atmosphere from the east.

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* December, 1837 and now again April, 1838.

† East India Magazine.

While the irregularities it has occasionally presented in its progress are not to be wondered at as long as the partial currents of the atmosphere are often such as to baffle all description or attempts at arrangement.

The deductions from the consideration of the spreading of the epidemic as above given are of infinite importance in pointing out to us that as all these types referred to arise from the influence of the epidemic constitution, so when they are once established their future progress will depend on the intensity also of the febrific constitution. To illustrate the subject; suppose a body of two hundred men,' immersed in the epidemic constitution, separate into two divisions, taking opposite directions, one towards a locality where the epidemic always rages with intensity, the other towards a lofty and healthy range of country. The first party will perish in the collapse of cold blue cholera, but the second will present the type of remittent typhoid, with a contagious character; and along the route pursued will this developed influence (not now observe) exert its specific action; not in the production of typhoid remittent but (observe well) in the production of cold blue cholera. Let the reader therefore take this into consideration, and after he has perused these few remarks let him turn to the short chapter on contagion phygiologically considered in reference to the epidemic under consideration.

From the foregoing observations not only in the last chapter but generally throughout the work, it will be perceived that the difficulty of tracing the march of the epidemic, is in a great measure done away with; because the existence of diarrhœa, or dysentery, or cholera, or influenza, are equally indicative of the presence of the febrile constitution;—and hence if it is attempted to trace the march of cholera by itself alone, the indication of the prevailing constitution will not be exact. I will explain. For instance, if, over a line of country, cholera prevailed at long and irregular distances and recurred at intermediate positions in the manner of a retrograde movement, the enumeration of dates of seizure, would present a false view of the progress or influence of the epidemic constitution. But when we discern the consanguinity of diarrhœa, dysentery, cholera, ague, and influenza, we are no longer at any difficulty in tracing the progress of disease in these different forms spread over the face of the country generally about the same time, but presenting a gradual and easily traced development. Hence in 1816-1817, the universal prevalence of the febrile form of the epidemic all over India, (to several severe examples illustrative of which I have alluded) and subsequently the gradual development of the intensity of the febrific constitution, as shown in the excessive preponderance of the cold stage or cholera which began to prevail in a severer epidemic form than it had done for long within the memory, or (perhaps I should rather say) within the knowledge of those who had opportunity, wish, ability, or object, for communicating information.* Hence a map of the progress of cholera merely points out the excessive intensity of the febrile constitution, but does not display the rise and progress of the epidemic, or throw any light on the nature thereof. To do this, the rise and progress of the minor forms must be regarded, and enumerated with the same care and attention as the more severe, because they are all links of the same chain; if they are left out the chain is broken and the march of the epidemic cannot be traced.

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* I think it is in Dr. McCosh's Topography of Assam stated that cholera has prevailed there from the remotest times, and that cold water is used freely in the cure in various ways. In 1817 no one would have credited either of these facts.

APPENDIX.

The foregoing views deduced from personal and practical experience in both the choleroid and febrile diathesis of the epidemic.

I have endeavoured to embrace in the few foregoing chapters all that occurred to me as being of practical importance. It is solely from experience in the treatment of the different forms of the epidemic that I have been enabled to combine and associate my ideas thereon; and still have found it difficult to avoid becoming entangled in the labyrinths of hypothesis. Had I not also had the disease myself I do not suppose I would have attempted to write fully upon it, or, if I had, I would, no doubt, have formed some new and improbable theory. As it has happened, however, I have merely described the symptoms I myself experienced; and, as I have had the disease three times, I am enabled to speak regarding it with more confidence than I otherwise could possibly have done. In each of these three attacks the contents of the stomach were freely discharged upwards, and that of the bowels downwards; and I conclude from this circumstance, and its consequences in my own case, as well as in that of others, that the main object in the treatment of cholera is, the speedy discharge of these, by the gentlest means we have at command, means, too, which will at the same time, tend to allay the urgent thirst, and thin the thickened blood. Thus are three important objects attempted to be gained, at one and the same time, by the same means, which are relished and desired by the patient.

If the contents of the stomach and bowels are not speedily discharged, the train of all the diversified symptoms is soon kindled, and these apparently so different in each case that they would not, at first sight appear to be the products of the same disease, or to belong to the same epidemic. In 1826 I formed the idea that, the absence of the biliary secretion in the primæ viæ was the main link in the chain of symptoms and afterwards endeavoured to imitate nature by causing a bitter substance to pass along the primæ viæ, this was aloes combined with calomel, given at repeated short intervals. I have given the dissection of a case wherein I pursued this treatment, and the singular fact was presented of the patient surviving a week, notwithstanding it was one of the severest cases I had ever seen. Had I known of Sydenham's system at the time, the patient might have been saved; the dissection displayed the paucity of the sanguineous fluid.

thetical reasoning altogether unnecessary, especially when we perceive from analogical reasoning the rational explication of the train of symptoms. Had there been no change in the condition of the contents of the primæ viæ, that is, had they retained their feculent bilious character, &c. then there could have been no reasoning on the subject in this particular way from anology. But when we see such a change in the contained matters of the primæ viæ so opposite to the condition of health (as I have pointed out) then no other conclusion can be formed but that this abnormal condition, the first nearly in the chain, is the leader of all the consecutive train of symptoms. Even leaving out of the question the changed condition of the contents of the primæ viæ there is sufficient in the complete absence of the biliary secretion to account for every symptom. The bile is, I may say, the solvent of the blood, and the resister of putrefaction ; its absence, therefore, is the thickener of the blood, and the promoter of fermentation, and it is easy to follow the train of symptoms arising from these two conditions respectively of the blood and the contents of the primæ viæ.

The subject of stimulants for the cure of Cholera, is one on which the public is always harping, and anonymous writers always recommending because they do not understand the disease.

I will explain the matter to them. An individual in rude health may relish for the most part strong spirituous and fermented beverages ; and his meals as hot as they can be made with all manner of stimulating condiments ; these agree with the system, the blood is replenished, and perspiration established. Now the vulgar idea is, that if in health these things are beneficial, or I should rather say are productive of artificial excitement, how much more necessary must they be in the cold collapsed condition of cholera, and consequently they recommend (and force down the patient's throat, against's his will) ardent spirits and cayenne pepper. It is only necessary to tell these anonymous writers that in the majority of fatal cases of cholera there is found inflammation of the stomach and bowels, in many cases the consequence of the stimulants that have been given. Again, the public are deceived by persons recovering who have taken ardent spirits ; now the reason of some thus recovering is this ; viz. they have had free vomiting and purging and hence the cause of irritation and inflammation no longer exists, so that these would have lived whether they got stimulants or not. Another cause of error is the failure of stimulants ; the vulgar here conclude that the stimulant was not given in time, whereas it was quite the reverse, viz., the stimulant was poured in while the cause of irritation and inflammation was still actively creating disturbance in the stomach and bowels. In a word, the patient's desire is the best guide ;

give him brandy and water, a 100 to 1 he spits it out; give him plain water he swallows it with avidity.

Carbonate of Soda and Tartaric acid, form an agree able drink, and act as a gentle laxative in removing the irritating matters from the primæ viæ, at the same time also the fluid enters the blood; the tartaric acid is also partly decomposed; and the soda dissolves the albumen.

It was mere accident as I have mentioned that directed me, in my own case, to the use of this neutral salt. It was the urgent thirst that instigated me, despite every other consideration. And, I would not have ever thought of giving it to another individual affected with cholera, not being sure of its effects.

The 2nd time I had cholera, I took champagne; the attack was not a very severe one; after free vomiting I swallowed a bottle of champagne, in two draughts at invervals of five or ten minutes. It was agreeable in the extreme (although it had not been cooled, except inasmuch as that a wet cloth had been kept round it while it was brought from the mess house). The thirst however returned, and I had recourse again to champagne, the second bottle I did not relish like the first, probably it was not so good, and after drinking a part of it had recourse in preference to some other diluent to allay the thirst. It is evident champagne cannot be taken in that quantity necessary to allay the thirst, and act as a gentle laxative, the indications to be fulfilled in following out the first principles of treatment; besides, it would be contra-indicated in an inflammatory condition of the stomach and bowels the consequence of the retention of indigested fermented matters. It was not theory that directed me to the use of the remedy, but, as I said before my own feelings at the time I perceived it before me on the table, whatever may be the after chemical changes the salt undergoes I will not stop here to enquire. I will only remark that given dry in powder like calomel it would have no effect, hence I did not give it with a chemical theoretical object in view, but with an evident mechanical one, viz. assisting the contents of the bowels downwards, while, at the same time, the loss of fluids the blood had sustained would be supplied, by a beverage which is agreeable, and may be repeated in any quantity every few minutes with pleasure to the patient and advantage to the disease.

Any fluid which will pass downwards in quantity, removing all offending matters, will have a similar effect; hence the declaration of Sydendam which I have already given in my Key. When the irritation is removed the absorption of the remaining fluid into the blood immediately commences as a matter of course.

Some ignorant, vulgar, anonymous scribblers would constantly attempt to poison their fellow creatures, while others, jealous, and envious of the labours of their brethern, cry out, from behind the scenes, that they have discovered that it matters not what is given in cholera, whether arsenic or prussic acid, or diluents of effervescing draughts.

Now I have gone to the trouble of condemning these gentry on their own evidence in the first istance of stimulants : and here in the second I will also go to the useful trouble of again condemning them in their own words. Now we will suppose for a moment for the sake of argument, that all do die who get cholera, or, that if they don't, that they would recover whether they got medicine or not.

Then, how barbarous and inhuman must it be to deny to the sufferers during their intense anguish that which they eagerly desire, and which they know will relieve the misery of their burning thirst, and refresh their sinking spirits. Thus we perceive in one instance are these scribblers ignorant of pathology; and in the second, that they display a complete want of common sense, or of the reasoning faculty. Their moral character is also more contemptible than either the priest or the Levite, for they not only will pass by and leave the traveller to perish of his wounds, but they will prevent others from pouring in oil and wine.

The principles of cure in asthenic miasmatic fever is to thin the blood, and assist its passage outwards. Drastic purgatives are therefore contra-indicated; they are injurious.

All drastic purgatives, or whatever tends to thicken the blood, are therefore contra-indicated in these fevers. Having had the fever myself, I thereby perceived the principle of cure; whatever I took passed through me speedily unchanged, the fever still continued.

Quinine or other febrifuge given by itself will not cure fever, it must be largely diluted, and then the tonic, febrifuge, and diluent together, effect a cure. This leads me to say a few words on the

Carbonate of soda, (highly extolled of late years in the case of fever by Dr. Knight and others) which cures fever on the same principle as quinine, viz., by increasing or restoring the transpirability of the blood.

All febrifuges are inefficaceous, unless combined with fluids. The fluid itself, as well as its ultimate elements, have as much and indeed more to do with the cure of fever than the febrifuge itself; which is proved by the restoration to life of hopeless cases which have been left to die; the moisture of the atmosphere penetrates the tissues and effects what the febrifuges were unable to do. Again, in other instances, the only other perfect fluid in nature is found often to conduce to recovery when all other means have failed, viz. mercury (as I have pointed out); it breaks down the obstructions in the course of the circulation which neither quinine or carbonate of soda could possibly have done. This very effect, however, of mercury must be assisted by diluents, or else the fever will return at the period of the febrile or diurnal revolution (from causes already explained). Dr. Knight says, carbonate of soda cures fever by neutralising acidity. In the first place what I have just said on diluents refutes this, and in the second in like manner what I have said of its (and other febrifuges) failure in the last stages of fever when the vapour of mercury succeeds.

The alkali cures fever in the first place by restoring its deficiency to the bile, and second, by rendering the albumen more soluble, and thus by the assistance of fluid promoting the circulation and transpiration of the fluids generally throughout the system.

The cure of Cholera by mercurial fumigation has been lately revived by a French physician; re-published in the last number of the India Journal of Medical and Physical Science.

In 1828, Dr. T. Christie of the Madras establishment, brought to the notice of the profession (in his work on Cholera) the native method of fumigation with mercurial vapour in cholera; I have not heard if it has been followed up. There can be no other likelier method of combating the inflammation of the primæ viæ in those neglected cases where venesection, leeches, are inadmissible. I have referred to it under head Mercury.

Venous Injection of the Black oxide of Mercury in Cholera.

I am not aware if this has ever been proposed or tried. It occurred to me on reading of the failures of the saline injections into the veins; that as these last had the effect of restoring to temporary recovery, there must exist some lurking mischief which was the cause of the relapse, but which aqueous saline injection had not the power of subduing; this lurking mischief I considered, and consider to be inflammation of the primœ viæ to a greater or less extent, in different cases, and hence it occurred to me that the injection of the black oxide in these hopeless cases might afford chance of life. See "Action of Mercury" for explanation of the modus operandi.

Water distilled from different substances used by the ancients as a drink in the cure of Cholera.

Showing the degree of refinement to which they had arrived in the treatment of Cholera, and to which we have not yet advanced. They gave the water distilled from meat, &c. It will be found mentioned in the section on Cholera in Persian.

Charcoal in the cure of Fever, in 1817, *(lately in Cholera)*

was strongly recommended, by Dr. Cruickshank of the Madras establishment, in the severe fever which caused the abandonment of Ganjam, in 1817. It has lately been recommended combined with fat and treacle I think, in the cure of Cholera, by a wandering beggar in America :—and more lately by Dr. Parkin. Its action is mistaken. In ague and Cholera (in diarrhœa it should also answer) there is more or less fermentation in the stomach and bowels ; now the well known absorbing powers of charcoal enables it to correct in a great measure the offensive nature of the contents of the bowels both gaseous and liquid, and hence thus to conduce to the cure. It must be given in large quantities of liquid to enable it to be carried down, and hence in this way it is merely a modification of the natural treatment, since the other essential object (viz. the thinning of the blood) could not be effected by it alone. This leads me to speak of

Chlorine.

I am not aware if chlorine has been tried. Its adminstration perfectly accords with my views of the nature and treatment of cholera.

It would not interfere with the diluent system, and during its passage along the tube it would destroy the poisonous products of fermentation ; the cause of irritation and sudden asphyxia in many cases, and in others of a more prolonged death by inflammation and mortification. In the more protracted cases, where the contents of the bowels become black (as in instances of corresponding fermentation out of the body) and when also the evolution of sulphuretted Hydrogen is plainly perceptible, the chlorine solution is plainly indicated, both given by the mouth and by injection. In protracted dysenteries too where the colon is filled with putrid fermenting matters, what is better adapted for the correction thereof than the chlorine solution.

As digestion appears to be principally owing to the constant presence of chlorine, (probably by reason of its strong affinity for Hydrogen.) So its absence is synonymous not only with a stoppage of digestion, but likewise with the process of fermentation, nearly the first and the last link in the chain of developed and tangible circumstances presented in Cholera, so the indication in the treatment is the removal as well as correction of these altered contents of the primæ viæ.

The prevalence of cholera in Europe and India at present at the same time corroborates my remarks on the westering inclination of the epidemic, and on the wide spreading influence of the febrific constitution.

Accounts have just been received of the prevalence of the epidemic in the form of cholera at Rome where it is said to have cut off 10,000 inhabitants. This exemplifies the wide extended influence of the epidemic constitution, more especially of course displayed in the localities where the febrile form is proverbially and constantly prevalent. This cholera at Rome is not a new disease there, but is merely the endemic fever in an aggravated form. While the endemic fever therefore continues to prevail to the extent it does, so, in exact proportion thereto, will cholera (or the collapse stage) continue to prevail. The reader will perceive that this merely resolves itself into a repetition, that as long as fever prevails so it will become aggravated in unhealthy seasons. A remarkable example illustrative of this I have mentioned, viz. Cheltenham, where, by draining and other measures, not only did typhus fever, (which had been long endemic) disappear, but the cholera which was raging around did not visit the place; and so the same happy circumstances would be the results of similar measures in other places, that is,

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If endemics be eradicated from any particular locality, they will also cease to occur in an epidemic form.

This is daily illustrated generally thoughout large cities, where the lowest and dampest situations are the most unhealthy; and where epidemics rage violently when they make their appearance, leaving (in general) all the other parts of the city comparatively free. Now if these localities had not been occupied at the time, or if they had been drained, &c. and rendered healthy; the epidemic constitution might have reigned with impunity; and if with the smallest locality so with the largest city would equally happy consequences attend the complete system of drainage. England owes its healthiness to the constant extension of this system; and it is also a happy result that the productive powers of the land are proportionally increased; useful and luxuriant crops spring up where nothing but rushes would formerly vegetate. The complete and effectual drainage of a large city, with its suburbs and surrounding villages, like (for instance) Calcutta, would appear to me to be neither expensive nor difficult. It would consist in a series of deep parallel drains extending along and at right angles to the banks of the river; they would range a mile at least beyond the *suburbs* on all sides. They would be so constituted that their contents would drain off at low water when their sluices were opened. They would be filled or rather built up with drain tiles or bricks, or other contrivance to within a certain distance from the surface, and covered over with the soil. The distance necessary between each drain would be ascertained by observing the extent of surface which would be improved and freed from dampness by one or two drains already cut; as well as by observing the quantity of water daily discharged therefrom when the sluices were opened at low water. So much for the prevention of marsh miasma which may be considered a matter of yeast or leaven which rises from the soil in a state of fermentation from the presence of moisture remaining below the surface, but which, by means of drainage, is completely carried off, and thus a check put to fermentation, and consequently to the production of the febrile leaven which rises with the globules of gas, and which we often see resting on the surface of stagnant marshes, or to rise in great abundance when the mud is stirred at the bottom; nay, often the surface is seen covered with a thick frothy covering the product of the fermentation, part of which leaven must be carried up as the carburetted hydrogen escapes, but be confined below that altitude above which its ponderable nature prevents its rising; as witness for instance Otacamund on the Neilgherries, where the epidemic has never prevailed, except in individuals who had contracted the seeds of the disease in the jungles below. Having shown the extinction or prevention of febrile ferment the product of marshy or damp soil to be an easy matter, I will now say a word on as easy a method of clearing the filth from the drains, or common sewers, the fertile source of febrile ferment, and all manner of disease; this febrile ferment from the open common sewers, and the different tracts in the suburbs would in an unhealthy season, with a pestilential epidemic, tend rapidly to augment the virulence and extent of the latter and possibly to the depopulation or abandonment of the place. With such a noble river, and tide running constantly with the strength and velocity of a torrent, the drains and common sewers of the city of palaces, instead of sending forth at every corner the worst of odours, ought to be as free from smell as the waters of the river itself, from which, by the simple and cheap contrivance of powerful wheels erected on floats, sufficient water might be raised to insure a constant stream in every drain. In addition to this, the city might be constantly supplied by means of an aqueduct brought from a sufficient distance up the river upon the same principle as large tanks in various parts of India are constantly replenished from rivers however distant. These reflections were elicited on viewing the filthy state of many parts of the native town particularly the drains half full of black fermenting slush, &c. emitting abundantly and constantly the febrile leaven with carburetted and sulphuretted hydrogen and carbonic acid gases. Till this nuisance is removed the strong arm of the law is altogether powerless in enforcing that strict adherence to regulations necessary to the public health; since neither judge or jury would bring in a verdict of guilty against any individual however great a nuisance he might have created, as long as the common sewers and drains continued in a condition injurious to the public health.

For the cure of the minor or less dangerous forms of cholera the principles of treatment which I have endeavoured to lay down will be found to answer.

The work would have been swelled to too great great a size had I staid to consider every form and variety of the disease; the same general principle of treatment applies to all, whether the direct effect of poisonous ingesta, or the result of the natural supervention of the epidemic. The blue cholera or venous diathesis is often succeeded by the bilious cholera or arterial diathesis, and, unless cautious inquiries be made, the practitioner will be misled; for intance I had a case some time ago, that of M. B. Esq. (Madras civil service) (in the northern division); when I saw him he had a hot skin, quick pulse, headach, pain of right side, vomiting, eyes bilious. The case much puzzled me at first sight, but, on learning the patient had had an attack of cholera in the night with excessive vomiting, purging, then shivering, the case was clear. *Leeches*, refreshing laxative diluents, quinine and wine effected a cure.

Cupping Glasses to the region of the stomach in cholera, for relief of the distressing vomitings Delhi 1593.

Let no one hereafter boast of being the first to recommend abstraction of blood in cholera, for here let him know the fact that the most effectual of all methods for that purpose) and which will succeed when every other means will fail, was known at Delhi (in 1593) and then and there published to his countrymen by the illustrious Mahommad Arzance, in a work written under the auspices of the great Ackbar (hence the work was called *tebé* Ackbar).

The refinement also of the treatment in these days is worthy of admiration; and when coupled with the fact of its being now ascertained that cholera has existed in various parts of India from the remotest antiquity, and treated upon principles allied to the ancient refined treatment, the circumstance is still further replete with intense interest; which however indeed it would not have failed to possess, had there even been wanting evidence of its not having been handed down by tradition, or by the labours of preceding generations, whether Chinese or Hindoo, Copt or Hebrew, Greek or Roman.

The practice of cupping, as also the manner of injections with diluents in the cure of cholera, mentioned in the Persian account, surpasses, in refinement, as well as in effect, all the modes of modern treatment since recommended. The treatment which has come nearest to it, is that of Dr. J. Wilson and others of London, to which I have referred in the text; and which appears to have been more successful than any other plan that has yet been tried.

Venesection first recommended for the cure of inflammation in cholera in 1817.

Some may consider me here in error; and perhaps I may be but it appeared to me that Dr. Corbyn recommended venesection from having observed the state of the bowels as he described viz. " there was general inflammation of the bowels, liver, stomach, and lungs" and however general this description may be, yet as I am ignorant if any other before Dr. C. has recommended V. S. on similar grounds I will consider Dr. C. in the mean time as the first who has recommended this important measure in the 1817 epidemic. It is impossible to resist admiring that discrimination, which at the very first out-break of the epidemic in 1817, should have at once decided on copious bleeding Dr. Johnstone in his work on tropical climates, (1821) speaks of venesection, but he says nothing of the inflammation of the stomach and bowels; he recommends it for the spasms, regarding which, he says "*with regard to the spasms as they are totally unaccounted for by my predecessors neither am I bound to dive into the mysteries of the nervous system for a solution of the phenomena.* I can easily imagine that the brain must suffer, from the broken balance of circulation, as well as with its known sympathies with the stomach and liver, and thus, *in some measure*, account for the unequal distribution of nervous energy &c., I am the more disposed to this opinion from the circumstance, that in three desperate cases of Mort de Chien the spasms were instantaneously relieved by venesection. In one of them trismus had taken place, the eyes were fixed and pupils dilated; bleeding was attended with immediate good effects, and the patient was well next day."

It is a wonder Dr. Johnstone did not connect the spasms with the vomiting and purging, which are themselves the consequence of spasms of the muscles of the stomach and bowels, induced by irritation and inflammation of the mucous membrane. Dr. J. in the same edition gives a valuable communication from Dr. Shepherd touching the spasms and venesection; but neither in this is there any allusion to inflammation of the stomach and bowels. He writes " you have, I believe described a similar disease in India under the name of Mort de Chien, in which you recommend bleeding with other remedies. In more than forty cases which came under my care, during the four months we were in the harbour of Rio Janeiro, and on the coast, I found bleeding to syncope instantly and uniformly successful *alone. The intestinal spasms* were far more violent than any I had ever witnessed in the West Indies (where the disease is pretty severe) and have a strong resemblance to the convulsive spasm; so much so that I was generally called to patients said to be in fits, and the power of several men were required to restrain them. The first cases I treated with *warmth, frictions, volatiles*, and opium." A more important document than these of Dr. Shepherd's and Dr. Johnstone's there could not be, although they failed in seeing or tracing the connection, or rather development, of the spasms. As pointing out that connection, and corroborating the view I have given of the epidemic I will transcribe from the same work.

Dr. Curtis's admirable description of the symptoms of the disease.

In which will be perceived first the accession of vomiting and purging, and *then* spasm.

"In all of them (the eight cases (5 fatal) alluded to) the disease began with a *watery purging*, attended with some tenesmus but little or no griping.

This always came on some time in the night, or early towards morning, and continued some time before any spasms were felt.

This purging soon brought on great weakness, coldness of the extremities, and a remarkable paleness, sinking and *lividness* of the whole countenance. Some at this period had nausea, and retching to vomit but brought up nothing bilious. In a short time the spasms began to effect the muscles of the thighs, abdomen and thorax; and lastly they passed to those of the arms, hands, and fingers. * * * The patients complained much of the pain of these cramps; as the disease proceeded, the countenance became more pale, wan, and dejected, the eyes became sunk. The pulse became more feeble, and sometimes sunk as much as not to be felt at the wrist. *The tongue was generally white* and more or less furred towards the root. The coldness of the extremities *which was perceptible from the first*, continued to increase and spread over the whole body, but with *no moisture on the skin till the severity of the pain and spasms forced out a clammy moisture, which soon became profuse.* All this time the purging continued frequent, and exhibited nothing but a thin watery matter, or mucous. In many the stomach became at last so irritable, that nothing could be got to rest upon it, every thing that was drank was spouted up immediately. The countenance and extremities became livid, the pulsations of the heart more quick and feeble, the breathing laborious. In fine, the whole powers of life fell under such a great and speedy collapse, as to be soon beyond the reach of recovery.

In this progression, the patient remained from three to five or six hours from the accessions of the spasms." This leads me to illustrate the tenor of my observations by reference to a matter of fact to which I have often alluded, viz. that,

A poison passing through the primæ viæ will often leave behind it irritation, inflammation, and spasm; exactly as we observe in cholera.

And every one must have experienced the intense griping pain that is often caused by an accumulation of gas in different parts of the intestines, sometimes in the great, sometimes in the small. I have already alluded to carbonic acid gas causing vomiting not only by its elastic properties but likewise by its stimulating. Many (or indeed all) must have experienced the depressing effects of gas (or even common air)in the stomach,and that its speedy extrication prevented vomiting and spasm, and the feeling of extreme depression. Every one also must have experienced the sensation often previous to the operation of physic,—the feeling of acute pain together with extreme depression, and sinking with cold sweat, succeeded by a rumbling noise along the colon, when all the unpleasant symptoms disappear. Now the retention of these matters would cause sinking, irritation, inflammation, and spasm as we see them to do so speedily in cholora, when it rages during the reigning of the epidemic constitution. The effect of these is displayed in protracted cases, one, of many occurred in my own treatment, and which I have related at page 143 where the whole colon was found ulcerated. And the same happens in common poisoning, death is not always immediate, but frequently happens long after the original cause has been removed.

In several of the cases of cholera now prevailing in Calcutta I have seen some instances remarkably illustrative of the above. One patient, a little while attacked, with the true sunken countenance, suddenly started up and seized his right loins with his right hand, just over the caput coli and right psoas and illiacus internus muscles; and with an expression of countenance which too well bespoke the agony of his suffering both in the parts mentioned as well as on the organs of respiration. The contents of the caput cœcum here were prevented from getting along the ascending colon and they acted on the part and on the system in the very same way that a blow would have done if received on the same part.

Another case in the last stage much resembled this; there was no pulse, the skin cold and doughy, purging had stopped, but, there was acute feeling of pain in the region of the caput cœcum and right loins; the part was held between the fingers of a friend, who never relinquished his hold by the desire of the cold, expiring, speechless, pulseless, hurried breathing patient, who expressed his wish by a motion of his hand. Another case a (middle aged woman) in the last stage, cold, pulseless, and with extreme restlessness, had pain, but it was not in the cœcum, it was in the stomach, and a friend was applying constant pressure with the hand, the patient rolled about in agony, and turning over on her face suddenly expired: in this case also the purging had been stopt for some time. In another case the pain was in the hypogastric region, the purging had stopt, the patient a female was sitting up, moaning in agony at intervals. Another case, but here there was purging which had just returned again after being stopt for some hours, the matter passed was extremely offensive. There was no pain of abdomen. *There was a pulse;* there was thirst and power to swallow, and I directed the friends to give him whatever simple diluents he desired, to relieve his thirst and encourage the passage of the contents of the bowels downwards. The reader will not fail here to connect the singular fact of the continuance of the pulse with the continuance of purging.

In my own case I felt distinctly the matters running like hot water along the colon, particularly the descending colon, and as if mixed with air; a spasmodic action in the colon would have detained these matters, and the spasms would have been developed in the small intestines, abdominal muscles, and chest, and superior extremities, instead of merely in the lower as the matter for discharge passed along the colon and was evacuated, when a sharp hot sensation was experienced at the sphincter and rectum and indeed up the colon. All these and many other facts tend to point out that the contents of the bowels are the source of the irritation and spasm, and that consequently strictures in any part of the bowels will have the effect of bringing on this irritation inflammation and spasm in parts on the atlantal or superior aspect; and hence the reason why the pain is not fixed, but differs in almost every case both in position and degree. It should therefore never be forgot that,

Strictures in the different parts of the tube in cholera often produce such a change in the symptoms as to cause a difficulty in recognizing the disease.

All these cases I have mentioned above are corroborative of this in a certain measure, but it will often happen that more obscure cases will be met with. For instance we will sometimes meet with a case of excessive nausea and retching, but nothing ejected from the first except what was drank; no purging (because, *observe well*, the patient has been purged or his bowels have been opened some hours before the attack), extreme depression and feeling of sinking, dry or cold shrunk skin at intervals.—In another there will be an immediate tendency to collapse, deadly coldness of the hands, nervous sensations extending from thence to the chest, feelings of soffocation and hence inability to lie down. Pulse rapid and small, no purging or vomiting; this is another of these cases modified by the presence of spasm. These symtoms may increase terminating in death; they may be resolved into diarrhœa when the more urgent symptoms will subside; or gradually going off, a febrile diathesis will be developed, with a deranged condition of the primæ viæ, viz. pains in various parts of the colon with sympathetic nervous twitches; and eventually dysentery may be developed. All these and many more I have seen; the few I have mentioned will serve as a guide to beginners, in directing their attention to the spasmodic condition of the central columns of nervous expansions, the consequence, as I before have repeatedly mentioned of the retention of the irritating contents of the tube preventing the full development of the disease.

That irritation and inflammation of the primæ viæ are the connecting links between the 1st and 2nd or 3rd stages, is strengthened by the observations of different authors on the constitution of the watery *dejections, and condition of the blood.*

" *The following are the appearances Dr. Christie observed in the blood drawn by venesection or by leeches, from cholera patients,* 1828.

The following are the appearances I have observed in the blood drawn by venesection, or by leeches, from Cholera patients. Sometimes it has been perfectly black, of the consistence of liquid honey, forming a uniform coagulum after a few minutes exposure to the air; and these appearances it has retained for twenty-four hours, without separating into serum and crassamentum. In some cases it has been darker than usual, and has not become fluid after many hours exposure to the air; but has coagulated and separated a good deal of serum I have observed it of the usual dark colour, with red streaks; and these streaks appeared to increase in some instances as the bleeding was continued; and, lastly, I have seen it quite natural, except perhaps being a little darker than usual when first drawn.*

All the other morbid appearances that have been observed by different practitioners have been only occasional.

Secretion from the Stomach and bowels ib. 1828.

From a careful examination of the Cholera secretion, procured from the stomach and intestines of several individuals that died of the disease, I found that it has the following chemical characters and composition. It does not affect litmus or turmeric papers. It becomes of drak grey colours when mixed with calomel. It consists of two substances: the one a transparent serous fluid, the other an opaque white coagulum. The former is perfectly soluble in cold water, which enables us easily to separate it from the latter, which is quite insoluble. This separation (which indeed often takes place spontaneously, the coagulum being often found diffused in the form of flakes in the serous fluid,) may be considered the first step towards the analysis of the secretion; in the same way that the coagulation and separation of the crassamentum form the first step towards ascertaining the nature of blood.

The following experiments were made on the two substances taken separately †

d. Sulphuric acid produced a white precipitate.

e. It was coagulated by heat.

f. It did not affect litmus paper.

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* It is worthy of remark, that black-coloured blood is not peculiar to cholera I have seen blood, taken from rheumatic and dysenteric patients, in India, continue black for many hours after it was drawn. *C. (see my remarks. W. G. M.)*

† These experiments were performed two or three times with the same results.

2. *Coagulated matter.*

a. Insoluble in cold water.
b. Slightly soluble in boiling water.
c. Dissolved when boiled in acetic acid.
d. Dissolved by pure aqua ammoniæ.
e. Not changed when triturated with calomel.
f. Prussiate of potassa, when added to the solution *c*, produced a copious yellow precipitate.

The first set of these experiments proves, that the fluid parts of the secretion is pure serum, which, is particularly confirmed by *d* and *e*. The second set proves, that the coagulated part of the secretion is fibrin; test *f* being that which, according to Berzelius, particularly distinguishes that substance. The secretion, therefore, has a composition similar to that of blood, deprived of its colouring matter; but the proportions of the serum and fibrin in the secretion are, I imagine, seldom the same as those we find in blood; for, in most cases of Cholera, there is an enormous quantity of the serum thrown out by the stomach and intestines, with only a small quantity of coagulated matter.

We must conclude from these experiments, that the Cholera secretion is not merely an increased natural secretion of the mucous membranes, but that while this is increased it is also vitiated; and that it does not originate in an inverted action of the lacteals, as some have conjectured; for, independent of its being very abundant in the stomach and large intestines, where there are few or no lacteals, it has very little resemblance to chyle. The circumstance of its not affecting vegetable colours, proves that there is no free acid in the secretion; and thereby shews that Dr Ainslie's views of the disease cannot be maintained.

The turbid appearnce which the serous fluid sometimes has, and the different colours which the secretion occasionally exhibits, ought not to be considered as constituting separate varieties; for in all probability, they are owing entirely to the admixture of calomel and other medicines given for the cure of the disease. The creamy or purulent-like matter, mentioned above, probably differs little from the more common cholera secretion, except in the proportion of its constituent parts. It has a perfectly homogeneous appearance. From a great portion of it not being soluble in cold water, and being precipitated from its solution in acetic acid by prussiate of potassa, it may be inferred, that, like the more common secretion, it contains fibrin.

Extract from a report on the chemical pathology of malignant cholera by W. B. O'Shaughnessy, Esq : 1832. Collection of essays, Calcutta, Vol. for 1834.

"No. III.—*Comparative Analysis of Serum in Health, Malignant Cholera and Bilious Diarrhœa.*

INGREDIENTS.	Healthy Standard of Lecanu. 0.	Malignant Cholera. MrsBarras'. 1.	Bilious Diarrhœa. M. Hawthorn's 2.	Malignant Cholera. Dewar's. 3.	REMARKS.
Water,..	906.00	854.00	921.75	866.80	
Albumen,.......	78.00	133.00	61.85	124.0	
Urea..	0.00	0.40	0.00	0.00	
Organic matter: soluble in alcohol and water,......	1.69	*4.80	*5.20	*4.00	* Embrace the organic matter and albumen of soda.
Albumen combined with soda,..... ..	2.10				
Fatty matter : Crystalline,.......	1.20	1.40	1.90	1.23	
Oily,........	1. 0				
Muriat. Soda, Muriat. Potassa,	6.00	4.00	5,00	2.17	
Carbonate of Soda	....	0.00			
Phosphate of Soda,	2.10	....	2.30	0.5	
Sulphate of Soda,					
Carb. Lime,..... .. Carb. Magnesia,... Phosp. Lime,.... . Phosp. Magnesia,	0.91	1.60	1.10	0.70	
Phosp. Iron,......					
Loss,....	1.00	0.60	0.90	1.5	
Total......	1000.00	1000.00	1000.00	1000.00	

Analysis of Alvine Dejections.

The appearance of these evacuations was most characteristic. They were perfectly colourless, very fluid, and containing numerous white flakes, which subsided when the fluid was allowed to stand. The fluid having been filtered *through fine gauze*, the solid flakes and the liquid part were separately examined.

Conclusions.

These experiments indicate that the liquid portion of this evacuation consisted of water, mucus, albumen in small quantity, and muriate, acetate, and carbonate of soda. It contained no caseum, sulpho-cyanate of potassa, or bile.

Examination of Solid Portion.

Insoluble in alcohol and water; totally destructible by red heat. Readily soluble in acetic acid and alkalies, and not precipitated from its alkaline solution by acetic acid. *Not reddened when treated by* STRONG SULPHURIC ACID, *and cautiously warmed.* Precipitated copiously, of a yellow colour, by ferrocyanate of potash, from its solution, in acetic acid.

From these experiments, I am inclined to conclude that the flaky matter in *this case* was principally composed of *fibrine*. All practial animal chemists are aware of the extreme difficulty of distinguishing this substance, in the solid state, from coagulated albumen. The only mode of distinction I have ever been satisfied with is the experiments with *sulphuric acid*, which, when properly conducted, affords strong evidence of the nature of the substance under examination.

We thus find that the dejections in the case of DEWAR contained the most remarkable of the principles deficient in his blood*.

Plain Directions for the Analysis of the Blood and Alvine Evacuations in Cholera.

According to the facts detailed in this Report, the principal objects in prosecuting the analysis of these fluids are, 1. To ascertain the quantity of water in the blood; 2 The quantity of saline matters in that fluid; and, 3. The presence or absence of the principles of blood in the alvine dejections.

To accomplish the first, a very simple plan is sufficient. Take 1000 grs. of the serum or blood to be examined, place it in a common bowl, resting on a saucepan containing water; place the saucepan on an ordinary fire, covering the bowl with a piece of gauze. Continue the boiling until a bit of mirror glass is not dimmed by being held over the bowl. The water is thus expelled, and its amount ascertained by weighing the residuum. According to LECANU'S analysis, *blood* contains from 780 to 785 parts of water per 1000; *serum* from 900 to 906. The estimations may be taken as the standard of comparison between the normal blood and that drawn from the cholera patient. The quantity of salts is best ascertained by drying the blood or serum completely in the water-bath now described, and incinerating the residuum, in small portions at a time, on a little tray, made of folded platinum foil. A spirit-lamp is the best mode of applying the necessary heat, and the substance should be kept at a red heat until it ceases to be black on cooling.

The normal quantity of salts in the human blood is from 11 to 12 grains per 1000.

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* For additional facts relative to the constitution of these dejections, see Pages 26, 27 and 28.

It is unnecessary to enter into a qualitatve examination of the saline mass thus obtained. It is only essential to touch it with a little moistened turmeric test paper, or with litmus paper previously reddened by an acid, in order to find if any alkaline carbonate be present. A red stain on the turmeric, and a blue on the litmus, test papers, sufficiently prove the presence of the alklies or their carbonates.

The alvine dejections may be simply examined by the immerison of these test papers—by the boiling of their fluid parts in a Florence flask, and the addition of the prussiate of potash. The evidence of alkalescence with the former, and coagulation by either of the latter, is sufficient to show their nature. Those who have leisure or inclination for further experimental details, may follow the processes adopted in the examination of the saline parts of the blood. See Appendix, No. 1.

CONSTITUTION OF THE BLOOD AND ALVINE EVACUATIONS OF THE DISEASE NOW PREVAILING IN LONDON.

Analyses by MM. Rose *and* Wittflock, *of* Berlin, *of the same Fluids in the Disease recently prevailing in that city. Identity of Chemical Pathology of Cholera in* Newcastle, London, *and* Berlin. *Consequent identity of Cholera in all these places.*

Since the preceding Report and Appendix were submitted to the Central Board of Health (7th January 1832), I have received the *Gazette Medical de Paris*, of the 14th January containing a most important article on the chemical pathology of the malignant cholera.

The article alluded to is an epitome of the results obtained by the celebrated Rose and by Mr. Wittflock, in an extensive series of analyses conducted at Berlin. These results, I feel much gratified in stating, correspond entirely with mine, as the subsequent translation of the passage in the *Gazette Medicale* will sufficiently denote.

"MM. Rose and Wittflock have communicated to us the result of their experiments on the blood of persons labouring under cholera. Despite of all the exactitude of their researches, they could not find the acid character of the blood which M. Hermann asserted to exist.

"They have observed, that when the blood contained in the right ventricle of the heart of the cholera patient is dried with great care, 30 parts per cent. of solid matter are invariably obtained; while in the state of health the blood only affords 21 per cent. This morbid proportion has been constantly found, as well in the blood of children as of old persons; neither did sex occasion any difference of results.

"The *serum* of the blood of a young man, æt. 20, who died of intense cholera, had the sp. gr. of 1,447, and afforded, when dried, 16 parts per cent. of solid matter. In a young woman, in good health, MM. Rose and Wittflock found the sp. gr. 1.28, and that the serum only contained 9½ p. c. of solid matter.

"The dejections were strongly alkaline, and contained albumen. These experiments, frequently repeated at the cholera hospitals of Berlin, have invariably been attended with the same results."

The identity of the chemical pathology of the cholera of Berlin and Newcastle being thus fully proved, I was naturally anxious for an opportunity of examining into the state of the blood and the alvine dejections in the disease now prevailing in London. I felt that my Report could not be complete, did it not comprise this important feature; and I also felt that the results of my experiments would throw great light on, and perhaps altogether decide, the professional controversies, which the irruption of the disease in London has unhappily occasioned.

I have now completed the analyses of four specimens of blood, drawn from persons labouring under this disease in its severest forms, and of eighteen examples of the peculiar dejections, obtained from patients in different quarters of London.

The results correspond so perfectly in every particular with those of the Newcastle and Berlin analyses, that to describe them would be but the repetition of the same terms.

I have also availed myself of the interval which has elapsed between my return from the North of England and the publication of this Report, to examine still further, whether in ordinary diarrhœa the blood experiences this particular change, and whether the dejections ever present the same properties in any other disease or condition of the system.

In all the cases of ordinary diarrhœa, I had an opportunity of examining amounting to seven in number, the blood preserved its normal proportions.

Of more than 1000 cases of ordinary diarrhœa, the dejections presented no single property of the cholera evacuations.

Artificially I found in one experiment that the administration of a powerful saline cathartic to a person while fasting, can produce the transudation of part of the constituents of the blood, rendering the dejections similar to the cholera character in kind, but widely different in the *degree* and quantity of the transudation.

I am thefefore entitled to conclude, that the exudations of the colourless part of the blood constitutes one of the chief diagnostic characters of the malignant cholera.

That the inspissation of the blood is essential to its pathology.

That these conditions being alike in the diseases of Berlin, Newcastle, *and* London, *the diseases in these three situations are entirely the same;* and lastly, That in the fluidity, alkalescence, and albuminous nature of the dejections, we have the means of forming a certain and chemical diagnosis between this disease and others, with which on a general consideration of ordinary symptoms, it may be confounded. The chemical re-agents for the examination of these conditions are. 1st. Turmeric paper, which is turned brown by the dejections, 2nd. Boiling in a glass tube or flask, by which the albumen is coagulated. It is necessary to state that these conditions are, of course, more remakable in the early period of the disease. When the diarrhœa has persisted for some hours, the alkaline character is frequently lost from the simple fact of all the alkali of the blood having been passed away. The quantity of albumen also declines for a parallel reason, and requires the test of ferro-cyancte of potash for its detection."

Excessive fatigue of itself will not induce cholera; but when a heavy meal is taken after excessive fatigue, then, during the reigning of the epidemic constitution cholera will almost of a certainty be the consequence.

If the reader will turn to page 26, he will find, in the first place, mention made of the glutton and epicure as illustrative of this point in a certain degree; and at the same place he will find a recital of the consecutive train of symptoms, resulting from the combined influence of the effects of excessive expenditure of fluids and epidemic constitution. Now, that had reference to ordinary conditions of health; let us therefore consider for a moment that the expenditure of the fluids may be doubled or tripled from excessive fatigue, and then will be presented in still stronger colours the natural development of symptoms. But I have not hitherto called into my aid nervous energy, let me do so now, and it will be seen how forcibly the truth is displayed when it is conjoined. Suppose then two bodies of troops 500 strong each are set to guard separate and respective important posts, both localities extremely obnoxious to the febrile form of the epidemic, ague. Both bodies of men are exposed night and day to constant fatigue of mind and body; and the majority of both in a short time disqualified for duty. Now that detachment wherein the ague is cured after the manner I have endeavoured to display in the text, will (every man of it) be, after a certain time fit for duty, and ready at his post; but that, wherein the reducing, enervating (that is, in plain language, weakening the system), plan (which I have condemned) is pursued, will every man of it be either dead or obliged to leave the post. So much for reduction of the powers of the system in the asthenic epidemic. But to render the subject still more plain to the general reader I will mention a familiar example of daily occurrence, though perhaps not remarked by many. Suppose a body of 50 men arrive after a long and fatiguing march from morn till eve, during the reigning of the epidemic constitution, at a station where the disease prevails, and that 25 of these fall immediately asleep from circumstances over which they had no control, whether as regards their natural instincts or their means of subsistence; and that the other all partake of heavy meals,—these last will fall victims to cholera, while the former will all escape. The simple explanation of this is that in the case of the last there was not either sufficient nervous energy, or a sufficiency of fluids to effect the complete digestion of the aliment that had been received into the stomach. But I will bring the subject nearer home; by mention of more familiar and daily examples; and in these the natural instincts will be found to direct the choice to what is conducive to the support of the nervous energy, and hence to the continuance of life, or in other words the prevention of cholera, or some other form of the epidemic. I allude to the Indian sportsman in particular, and to officers generally. Now it is a notorious fact that, during the prevalence of cholera in a place or in a corps, a very small proportion if any at all of the officers are attacked, while, all around, the inhabitants and dependents are dying fast; now this results from the better mode of living in a certain degree; but does not account for the strange diversity in the rate of mortality, when we know that many are those amongst the higher classes who are out from morning to eve in a burning sun, and exposed to excessive fatigue, yet escape the disease. The reason lies in this fact, that these, instead of making a still farther demand on the already reduced powers of the nervous system, by throwing in a mass of aliment into the stomach, there to undergo morbid changes and induce vomiting and purging because the system has not the power to digest it; I say instead of doing this, instead of reducing the already reduced powers of the system, they pursue an opposite and natural system by adding to, instead of taking away from, the powers of life. After the fatiguing exertion under a burning sun, whether on duty, or in the pleasures of the chase, or Nimrodian exertion of any kindly, not only the fluids of the system have become much thicker than they were by reason of the excessive expenditure by perspiration and exhalation but the strength of the system is also greatly reduced; now a further call upon the system to effect the digestion of a heavy meal at this time would be attended with the worst effects, as we see it is in too many instances, where the natural instincts have not been followed. These natural instincts are generally observed by the higher classes and those who have the means of gratifying them; hence what does the sportsman do when weary and exhausted, he sinks in his chair after the labours of the day? he does not stuff himself with a heavy meal which, although he could swallow, yet he feels it would be contrary to what an internal monitor points out. No he does not do this, but on the contrary, restores to the system the fluids it has lost, and to the internal organs the bitter principle that has had such a heavy demand made upon it; swallowing the beverage (which the reader will recognise if he has ever been after a sounder of hog between 12 and 3 o'clock in the month of May) he retires to enjoy a few hours repose, and wakes ready to digest a hearty meal, and commence again the labours of the day.

A similarity of caution is within the power of all high or low. But the poor anxious to save every mite, never reason on the consequences of a heavy meal after their excessive labours of the day, frequently too, this meal is the cold remains of the preceding day; the system cannot digest it (for the reasons given) and they fall victims to cholera. The poorer the diet the greater force, power, or strength required of the system to digest it; and if there is not strength sufficient for this, then the meal undergoes changes, and when these changes arrive at a certain point, or when the mass becames a source of irritation, then it is rejected by vomiting, and if it is not all rejected by vomiting then some of it passes downwards and causes diarrheæa, and thus during the reigning of the epidemic constitution is cholera engendered or aggravated. We see therefore of what vast importance must be a strict attention to diet during seasons of a pestilential constitution. It is the pivot on which hinges life or death, and it is the point in the treatment to which our ideas (as I have explained) must be constantly directed.

Being of such vast importance let me endeavour to turn this knowledge to useful practical purposes. Suppose then two establishments, each with a large body of labourers, and that cholera is raging in the neighbourhood. In one establishment the labourers, take their principal meal before going to work,to which they do not go so early as the labourers of the other establishment who take their principal meal after the labours of the day. In this last establishment will cholera speedily and fatally make its appearance, while within the former it probably will not at all appear. And it is almost needless to remark [that if the diet is good and nutritious, there will be still less chance of sickness of any kind prevailing in the former instance. In private establishments we perceive therefore how much is in the power of individuals in regard to the instigation of disease and death. In public establishments too the same applies; a remarkable instance of the immunity of a public establishment from cholera (while it was raging around) has just been recorded, and in reference to the present subject I here relate it.

" Whilst the cholera and fever are spreading death and devastation in this populous city, the jail which had for the last six months averaged from 150 to 200 inmates, had only two cases of sickness which occurred within its wide domains, and neither of them proved fatal; both were speedily cured. *Hurkaru*, May 2d. 1838."—Calcutta.

From the foregoing remarks it will be at once perceived how much the celebration of the religious ceremonies by the Hindoos and Mohommedans must tend to the increase of mortality during the prevalence of the epidemic constitution. To those who have seen these ceremonies all descriptions of the excessive bodily exertion displayed by the devotees would fall far short of the mark; but suffice it to say that for days and nights together, there is nothing save howling, screetching, jumping, dancing, rolling on the ground, cutting maiming, fighting, abusing, carried on (in the true and frantic fury of superstitious devotion,) till the actors sink exhausted on the ground, or are carried off by the epidemic in the way I have just described, after stuffing their exhausted bodies with indigestible aliment.

In reference to the mortality among the religious devotees it was remarked (at the last meeting (on the 7th April) of the Medical Society) by Dr. O'Shaughnessy " *that 20 Mahomedans were now being cut off by cholera to one Hindoo; the Mohurrum, the great feast of the Moors, having just been celebrated; and that as the Churruck poojah, the great feast of the Hindoos, was commencing, they would suffer in their turn. Dr. O. believed the difference was to be ascribed to exposure and liberal potations of sherbet.*" *India Journal M. and P. S.*

In connection with the same subject, viz., (the mortality from cholera) I herewith copy from the Calcutta Courier the notices thereon. How far perfect and free from error I am not prepared to say, they are not, however, without considerable interest.—

April,	1838.	3d	54	deaths.
,,		4th	65	,,
,,		5th	49	,,
,,		6th	85	,,

The large number of 85 yesterday may be attributed to the last day of the Mohurrum, and we may expect an equal if not greater number on Tuesday, the 2 great days of the Churruck Poojah.

,,	7th	92	deaths.
,,	8th	93	,,

It appears that of the above, the deaths among Mahomedans and Hindoos were as 20 of the former to one of the latter.

		Fotal cases	Hindoos	Mahomedans	Christians.
April,	12th	37	18	19	0
,,	13th	53	25	26	2
,,	14th	27	16	10	1
,,	15th	46	34	11	1
,,	16th	52	37	15	0
,,	17th	37	29	7	1
,,	18th	39	27	11	1
,,	19th	32	21	6	5
,,	23rd	54	36	17	1
,,	24th	40	32	8	0
,,	25th	51	34	14	3
,,	26th	48	39	8	1
,,	27th	58	44	14	0
,,	28th	63	46	16	1
May, 1838.	2d	53	41	10	2
,,	3d	66	57	9	0
,,	4th	41	33	8	0

Black pepper in Cholera.

Much has been written lately about black pepper for the cure of cholera; this results from not knowing that it is not only employed largely as a medicine, but that it is the principal ingredient in that famous beverage of the Mulls, Mullaghotanie. Dr. Ainslie in his Materia Indica says, page 304,

"As a medicine, the native doctors of India consider black pepper as a stimulant and stomachic, and prescribe an infusion of the

toasted berries of Black Pepper

In cases of cholera morbus; and I have myself known it put a stop to the vomiting in this disease when many other remedies had failed.

The use of black pepper as a seasoner of food, is a never failing ingredient in many of the Indian dishes, *curries, mellaghotanies, pilows,* &c. as well on account of its pleasant flavour, as from a conviction of its powerful stomachic virtues; it is doubtless the most valuable of all the spice kind."

Dr. Ainslie's advice is not to be rejected, and I should say after the stomach and bowels have been cleared of their load, *and there is a tendency to the febrile diathesis*, that nothing could be better calculated to effect the desired object of determining the arterial stream to the surface. In my own case at this critical period (viz. the rise from the choleroid diathesis) I took very hot water with a little brandy and sugar in it,because it was at hand; but I need scarcely say how delighted I would have been to have had presented to me adish of smoking (*native, N. B. for the English is too thick for the object now in view*) mulliaghatanny. The next time I get cholera I shall certainly have some prepared, ready to take *when I perceive the instincts pointing to something hot.* Dr. Ainslie in the same chapter has a note on

Magnesia in cholera.

Which I will here transcribe, he says,

"A far more certain mode of combating that disease, in its sporadic form, is by a speedy use of calcined magnesia in tepid water."*

Bis-barri, Poison Pills.

A medicine in constant use with Hindoo hakeems in Calcutta, in extreme cases of cholera. I saw 50 cases at least, in which the Bis-barri had been exhibited. I believe they were nearly all fatal. I could not say that I discovered any extra symptoms that seemed directly to flow from its influence. Dr. A does not allude to the bis-barri in cholera, from which it would seem to be implied that it is not in use among the natives of the south of India in extreme cases of cholera. From one source I learned that the pills are made up of the venom of the snake mixed up with the berries of the phyllanthus emblica, (*anwla*), honey (*shahad*) and black pepper (*gool mireech*). From another source that they are compounded of *halahal*, (a strong poison) said to be from the *kayouty* snake, *mercury* and *sulphur* rubbed up together, *dárh-mooj*—said to be *lal sumbool or-red realgar*, and *mitha* an active vegetable poison—four annas weight of each of these. "The mercury and sulphur are rubbed well together so as (I understood) to fix the mercury. The mitha is mixed well with a little water, and the dárh mooj is also incorporated well with water, and the hâllâhâl mixed therewith. All these are to be mixed with the juice of ginger, and allowed to stand two days. They are then again well mixed, and when become thick are made into pills the size of mustard seeds. Two of these are rubbed up with a little lime juice or cocoanut water and given in extreme cases"†—so says Juggid Narrain Roy—Allah Alim !!!. I shall make further inquires upon this subject, as I have my doubts thercon, for this reason, that I do not consider the natives to be such fools, or that they do not know that it is the general belief that the poison of the snake may be taken into the mouth or stomach with impunity. This is my impression at present, I may be wrong ; but if the stomach is ulcerated or its surface abraded, as it is sometimes in cholera, then the effect may be produced.

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* See appendix page 17, for Dr. Christie's remark on Dr. Anislie's opinion.

There is however another circumstance which may be possible, that is that although the tongue and mouth may not suffer from various poisons, yet that when these same lie in the stomach any time they may produce certain effects.

The effect of bis-barri is described to be *borra gorm; excessively heating, very stimulating;* but all these reports must be received with extreme caution at present ; the real truth will soon be ascertained. I wonder the Hakeems do not think of introducing the poison (diluted) by puncture, into the system ; since they seem so fond of this (*said to be*) kill or cure system.

A commission for inquiry* into the nature and treatment of epidemics, would elicit the most interesting results, and would lead to the establishment hereafter, of certain decisive measures for the protection of the public health. That is, that in times of great pestilences, there would be some satisfaction in knowing that the mass of the people was not destroyed through the ignorance of their hakeems. The circumstance to be lamented in these days is the general ignorance of native hakeems of what has been written long ago in their own language. Even though unacquainted with anatomy, physiology, or chemistry, the native hakeem who well knew the precepts inculcated in many old works (such for instance as in the Tib-e-Akhbar,) would be more successful than the most accomplished European Hakeem who was just commencing practice. Therefore let it be observed that it is not by teaching the *present race* of hakeems anatomy, physiology, and chemistry, that they would be improved, or mortality lessened ; this indeed would be placing them in greater difficulties than ever ; but it must be by laying before them the standard authors in their own language, or selecting from these such parts as are of general interest and productive of public utility. With this object was it that I extracted from the work of Mahomed Arzanee the history and treatment of plague and cholera, that the present race of hakeems may no longer be discouraged, or amazed or terrified at the outward glitter, and high sounding fame of European therapeutics, but that on the contrary they may know that they have their own works, in their own language, containing the principles of treatment in disease, many of which far transcend all the laboured productions of modern days. Let us instance another example, arsenic for example; among the most powerful of remedies, has only of late years been adopted by the English in the treatment of disease; but we are told by Dr. Ainslie that "*The Vytians (Hindoo Doctors) have for many centuries been in the habit of prescribing arsenic (the white oxide) in very minute doses not exceeding the fourteenth part of a grain, in conjunction with aromatics, to check obstinate intermittent fevers.*"

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* Translation

† Composed of intelligent native hakeems.

What more need be adduced to prove the truth of my observations here? for the chapters on plague and cholera from the Tib-e-Akhbar speak too plainly for themselves to require any praise or eulogium from me. These last are excellent examples of the style of reasoning, or method of induction that I have throughout this work *endeavoured to inculcate;* in other words that

The grand object throughout this work has been to endeavour to display the principle which might serve as a guide in the treatment of every form of the epidemic.

The great difficulty I have always found in practice has arisen from the want of a ruling principle, which should apply to every form of the wide spread epidemic, the subject of the foregoing pages. I in vain looked in books for what I so eagerly desired; cases there were in abundance, and medicines there were in abundance; but, a general guiding principle there was none. It is the great fault in modern times to multiply medicines: in proof of which we have only to survey the vast assemblage of heterogeneous substances which have been from time to time recommended for the cure of cholera, and then couple this with the fact that the last and most successful treatment of the disease in England, was the simplest of all, and one which had been practised by many nations from the remotest antiquity, and the very one which I have endeavoured to display throughout these pages, *(having derived some knowledge thereof from three attacks of the disease)* and which the reader will also find fully laid down in the Persian transcription from Mahommed Arzaneê's work published at Delhi in 1593, the production of his extensive experience, as well as knowledge of the Arabian writers, who had gleaned much information from the Greeks, as these last had done from nations before them of equal renown and celebrity.

The little experience of which I boast arose in the first instance from personal suffering. The reader will find at page 51-52 allusion made to my case, with the ideas which were suggested to me at the time ; this was the choleroid diathesis. Several years before, I had suffered from the febrile, first at Nagpoor, and then at Chicacole on the Coromandel coast; and associating in my mind all the different attacks, and comparing them with what I observed to be developed in cases of the epidemic daily happening around me, I arrived at that conclusion regarding the epidemic which it has been the humble endeavour throughout these pages to attempt to illustrate. I have also alluded to several cases among many, which all tended to confirm me in my views of the epidemic ; two of these (cases of officers,) the reader will find at pages 99 and 100 ; I was nearly the means of destroying them both, from following the theories in books, not the natural system of cure. I thank God however that I was not doomed to suffer the pain of witnessing their death, but that their happy restoration to health assisted in opening my eyes to the capacious view of the natural system of the great epidemic tree, at the root of which lies cholera, at the summits of the branches pestilential fever.

From all these and many other circumstances (to some of which I have alluded in the preface and text) occurring through a succession of years, arose that natural view of the epidemic and those principles of treatment which I have endeavoured to explain.

The labours of hundreds have been wasted away in vain and fruitless attempts to discover an antidote to cholera.

Not more chimerical was the search after the philosophers stone. The epidemic is to be cured on particular principles, *not by particular remedies.* By one small speck in the heavens the traveller in the trackless forest can direct his steps whither soever he listeth ; but hide from him that small speck and volumes will not suffice to rectify his path. So have volumes been written on cures for cholera, and all have failed. But now the beacons of old,still glimmering have at last been descried peering out from amidst the murky vapours of a thousand deadly nostrums,—the smoke of whose victims rises in pillars of eternal infamy before heaven. These lights and guides of antiquity have at last been descried, for have I not repeatedly referred to the fact that the principles of treatment at last had recourse to in England are those which were known and practised 1800 years ago.

It is a happy circumstance that the principles endeavoured to be inculcated, are equally applicable throughout the whole range of the epidemic ; without this happening no system could have been formed; let us take an example for instance of a topical symptom engrafted on the epidemic ; let the reader turn to page 97 and he will find an example in point. In every case, no matter caste or country, these topical affections must be attached and treated upon a similar principle, guided of course by the judgment of the practitioner. The principle of cure in cholera I have repeatedly referred to; my own case at page 51 and in the "Key" sufficiently explain the undeviating principles to be followed.

The principle in the febrile diathesis is to throw off the fever by the surface, by the aid of venesection, leeches, diaphoretics; not to drive it in by drastic purgatives; see what Sanctorius says at page 66.

In reference to mercury I have also endeavoured to lay down a principle, as well as to point out the best means of its exhibition, by which at the same moment, we may salivate in a few hours any number of individuals.* What a powerful means therefore in cholera, when, through neglect of diluents, venesection, or leeches, or by the administration of astringents, inflammation has been established.

I earnestly beseech the reader to pay particular attention to the short notices of the cases of the officers at page 99-100; I hope he will not be a loser thereby.

These two officers I nearly destroyed by a blind adherence to calomel in pills, &c. at a time when it was not at all necessary; in fact I did not perceive that I was myself keeping up disease by reducing life to the lowest ebb, in which condition I now know that a pound of calomel would have no effect.

The principle of action of mercury I have endeavoured to lay down; the reader will find it under head "mercury."

Contagion too in reference to the great epidemic, I have endeavoured to define upon one undeviating principle, which is that the consecutive fever of cholera and dysentery are contagious, and that ague is also at times contagious; in proportion as they put on the pestilential diathesis. In other words that they are not capable of communicating the disease in the collapse stage for the reasons given in the text.

The westering inclination of the epidemic I have also endeavoured to reduce to principle, and to shew its dependance on natural and evident causes.

The principles displayed throughout the work, will be found to predominate in the Persian sections on cholera and plague published at Delhi in 1593. Regarding the latter disease I have been silent. Not having witnessed it in an epidemic form, it would ill become me to enter on its consideration; but it would as ill become me to hide from my brethren the excellent advice contained in the sections alluded to. I bring it forward too the more readily since the disease appears to have reached (or arisen in) the Indian empire, and to show an inclination to spread. This however will in a great measure depend on the prophylactic measures enforced by Government. Let the reader turn to p. 176 for an explanation. These measures should be constantly enforced by the severest penalties; and not merely resorted to on the appearance of severe epidemics; it is then too late for the evil has commenced. I have already alluded to the condition of large towns as influencing the intensity of the epidemic, and eventually leading to the depopulation or abandonment of the place. Whilst a possibility exists therefore of the plague being here engrafted on the intensity of an epidemic constitution, I gladly avail myself of this opportunity of pointing out the useful hints on that disease in the extract from the work of Mohommed Arzanee; and I may here remark that it is a singular proof of the truth of the natural doctrine of fever, that the principles of treatment laid down in this Persian section on plague, tally with those of my own, displayed throughout the sections on the great epidemic; and indeed when I come to consider the subject, I can perceive a corresponding *anatomical* relation between the degrees of severity in plague, and cholera and dysentery. But not having seen sufficient of the former I venture not at present to say more on the subject.

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* A large tent suspended from the roof of the hospital being all that is necessary; I have not myself applied fumigation to more than three at a time, not having more requiring it; but had there been 50 cases requiring that mode of treatment, they would have been subjected to it. It saves time and trouble, and is much more beneficial to the patient who takes, in this way, a much smaller quantity of mercury, and the effect desired is produced in 24 hours instead of in an indefinite period. But observe in cases of life and death, how superior this plan, for it will save by the celerity of its effects, when the other would not.

In reference to the Persian I will only here remark that throughout the sections I no where find excessive drastic purgatives recommended, and this agrees with my principles; I believe them to be death in plague, as they are in ague with which plague is always more or less ushered in, as well as the plague of India, according to the able reports of Drs. Panton, Maclean, Keir, Irvine, Russel, Shirreffs, and Glen.

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